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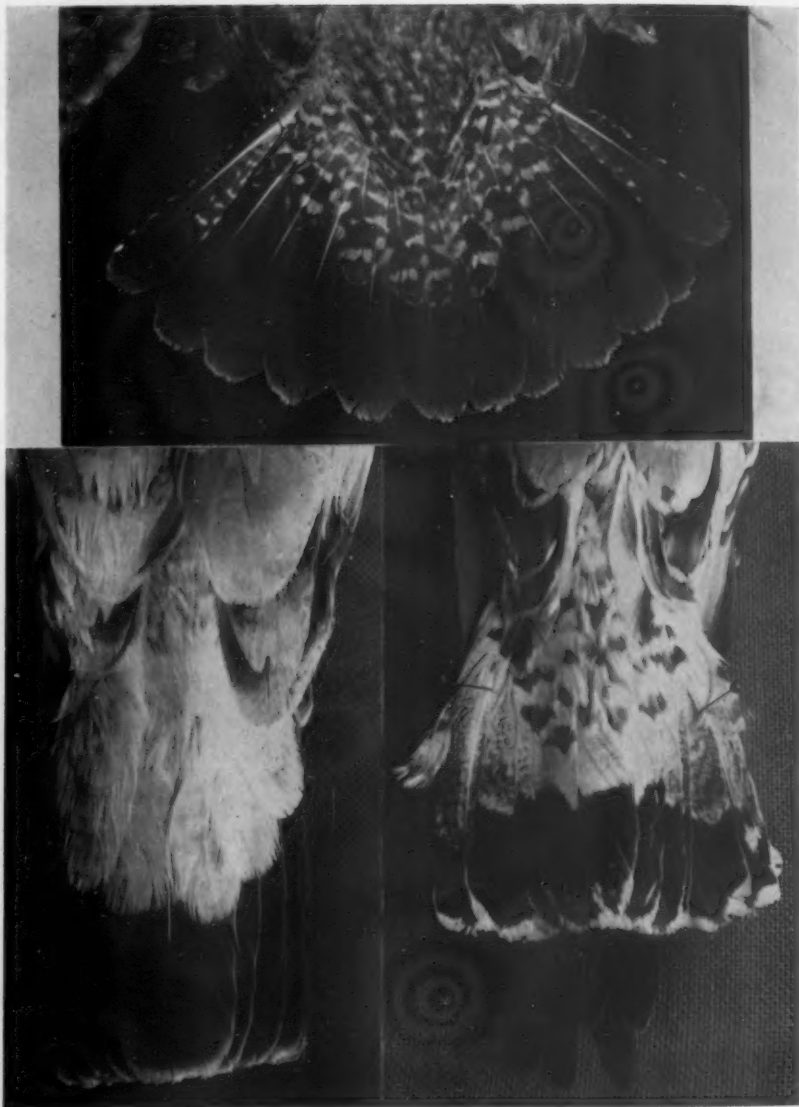
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(Upper figure), TAIL AND UPPER TAIL-COVERTS OF FIRST-WINTER HERRING GULL.
(Lower left figure), TAIL AND UPPER TAIL-COVERTS OF SECOND OR THIRD-YEAR
HERRING GULL (AMNH No. 358183).

(Lower right figure), TAIL AND UPPER TAIL-COVERTS OF IMMATURE RING-BILLED
GULL (AMNH No. 113577).

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PLUMAGE AND SOFT-PART VARIATIONS IN THE HERRING GULL

BY HUSTACE H. POOR

Plate 5

INTRODUCTION

In 1937, 1938, and 1939, a total of 21,561 young Herring Gulls (*Larus argentatus smithsonianus*) were marked with colored bands at eleven colonies along the Atlantic Coast as the initial step in a coöperative study by banders and field observers sponsored by the Linnaean Society of New York. The color combinations were different at each colony and in each year (*cf.* Bird-Banding, 10: 126, 1939), so that observations of the bands on a living bird would identify the year of hatching and natal colony of that individual. In previous papers (Poor, 1943, 1944) the writer has summarized the banding program and discussed some of the distributional information obtained.

The aim of the present paper is to set forth those results of the project, based on field observations of living birds, which relate to changes of plumage and soft parts with age. Variations with age, as determined by examination of museum specimens, have been discussed by numerous authors, notably Dwight (1901, 1920, 1925).¹ Dwight's conclusions have been concisely summarized by Allen and Hickey (1940). In such investigations the use of specimens has certain obvious advantages over field observations. Details may be critically studied, comparisons among various specimens may be made, and specimens may be examined repeatedly to check conclusions. However, field observations possess some unique advantages over museum skins. Soft parts are seen in their natural colors, and the large number of observations permits some statistical conclusions as to the propor-

¹ Following undated references to Dwight are to his 1925 monograph.

tion of gulls of a given age possessing certain characters. Of paramount importance is the fact that the ages of color-banded birds are *definitely known*. With museum skins one must infer the ages of the birds from those very plumage characters which one desires to correlate with the age thus determined. This was the only method available before the days of mass banding, but the logic of the expedient is questionable and the results are not always satisfactory. For example, Brooks (1943) disagrees with Dwight on the interpretation of the plumages of the California Gull (*Larus californicus*). Collected banded birds would resolve the conflict of these two authorities.

The possibilities of systematic collecting of banded specimens to solve various ornithological problems have been largely ignored in the past. In the case of the Herring Gull, measures to control the population are at present necessary, so that extensive collecting would not be detrimental to the species. In peace time, banded gulls are numerous, and in many places easy to collect. The taking of banded birds on the breeding grounds would disclose the proportion of interbreeding among different colonies, the age of first breeding, etc. Data on morphological variations with age *and sex*, not obtainable in any other way, could be secured. (Dwight states that females advance less rapidly to maturity than males, but sex cannot be determined without dissection.)

The work of Dr. A. O. Gross and associates at Kent Island, New Brunswick, has demonstrated that Herring Gulls return to their respective natal colonies to breed (Gross, 1940). This tendency toward reproductive isolation of breeding colonies from one another suggests potentialities of development of genetic differences among local populations, and suggests that critical studies of series of specimens from various Atlantic-coastal and Great Lakes colonies might reveal hitherto unsuspected variations. Dr. Ernst Mayr has pointed out to the writer that Stegmann (1934) and others believe they have found significant differences among birds from various parts of the European breeding range of the Herring Gull, although serious doubt is cast upon the validity of the presumed racial differences by failure to take into consideration the pronounced sexual dimorphism known to exist and studied in detail by Goethe (1937), particularly since the dimorphism is pronounced in those characters used to discriminate the races. Dr. Mayr recommends that investigators studying the differences among American colonies first collect a large series of accurately sexed males and females from a single colony and determine with this material the degrees of sexual dimorphism as well as of individual variability.

ACKNOWLEDGMENTS

In a program utilizing the efforts of numerous banders and field observers, detailed acknowledgments are impossible. However, special mention should be made of J. J. Hickey, who originated the project; C. L. Whittle and R. P. Allen, who actively sponsored it; and S. C. Harriot, who maintained the records. In the preparation of this paper the writer obtained helpful suggestions from Dr. Ernst Mayr, J. J. Hickey, and E. Eisenmann, and photographic assistance from N. W. Young.

SOURCES OF DATA

The basic data for this paper are the reports of observers on color-banded Herring Gulls studied in the field. The writer has checked certain points with museum skins, but unless specifically noted, statements and conclusions regarding plumage and soft parts are based on these reports.

Data from field observations by numerous different persons under widely varying conditions have limitations which must be recognized. Personal interpretations will vary among observers in regard to some of the characters that show gradual rather than abrupt changes, comparisons with color standards and with other specimens are impossible, and sight records cannot be later checked for accuracy. The advantages of known age, however, give the records a special value. Some of the reports submitted were complete and precise; others were practically worthless. The question of rejection or retention of any particular observation was usually easily decided. Where age is expressed in months it has been assumed that the bird was hatched in July, an arbitrary but convenient assumption which has also been used by others (Eaton, 1933; Gross, 1940; Brooks, 1943).

There are three sources of data: (1) observations listed on printed plumage-record cards distributed by the Linnaean Society's Gull Survey Committee; (2) the writer's records on cards of his own devising which seemed to him better suited for plumage analysis; and (3) data submitted in no standard form. In some places in this article it has seemed expedient to treat these three groups separately.

The writer examined 19 of Dwight's 22 "reference specimens" of juvenal and subsequent plumages of this species, and found none inconsistent with the results of the present study. J. J. ter Pelkwijk pointed out to J. J. Hickey that Dwight's first-winter reference specimen, JD 53,177 (AMNH 358,153) collected in England is not a Herring Gull, but a Lesser Black-backed Gull (*Larus fuscus*). Dr. Robert Cushman Murphy has kindly examined this specimen and informed

the writer that he considers it to be a second-winter male of *Larus fuscus graellsii*.

MOLTS

For an understanding of plumage changes it is necessary to be familiar with the various molts. These are elaborately discussed by Dwight, whose monograph forms the basis for the following brief summary. Gulls are hatched with natal down which is soon succeeded by juvenal plumage. A postjuvenal molt of the body plumage, but not the wings and tail, leads to the first-winter plumage, which in turn passes to the first-nuptial plumage through an incomplete prenuptial spring molt that does not include the wings or tail. Each year thereafter there is a complete postnuptial fall molt and an incomplete prenuptial spring molt excluding wings and tail. (The foregoing is valid for all species of gulls except *Larus pipixcan*, which has a complete prenuptial molt, and *L. maculipennis*, which renews the tail feathers at the prenuptial as well as the postnuptial molt. In Dwight's terminology, "nuptial" refers to the breeding season regardless of the reproductive capacity of the individual.)

In the Herring Gull the postjuvenal molt occurs from September to December, the prenuptial molt in March, April, and May, and the postnuptial chiefly in August, September, and October. Completely adult plumage is normally acquired in the fourth winter. There is considerable individual variation; throughout the plumage changes some birds are backward, and others probably precocious. Dwight states that males advance to maturity more rapidly than females. The important effect of hormones in determining the rate of advance toward maturity has been experimentally studied by Boss (1943—abstract in Bird-Banding, 15: 80, 1944).

PRIMARIES

The color and pattern of the exposed areas (top) of the outer primaries constitute a plumage character that is both definite and easily observed. The primaries are renewed annually at the postnuptial molt, and with but few exceptions are either (1) unpatterned dark brown with an edging of light buff at the tip, or (2) black with apical white spots and with a white subapical 'mirror' on the outermost primary and often on the adjacent one. The apical spots frequently, and the mirrors occasionally, are worn away as the feathers age, since these unpigmented areas are less abrasion-resistant than the dark areas.

According to Dwight, the primaries are brown for the first two years;

in the second winter "rarely there are slight traces of a white mirror on the outer (tenth) primary." Third-winter birds have black primaries with white apices and a white mirror on the outermost, although the white markings are deficient or absent in backward individuals. Fourth-year and older birds have white-tipped black primaries with a mirror on the outermost primary, and in about half the specimens, also on the next. Forbush (1925)¹ gives brownish-black primaries for first-winter birds, "largely dark or blackish, tipped white" for second-winter specimens, and black with white apices and mirrors for adults.

Since the Gull Survey cards did not provide specifically for recording this character, most of the following observations are the writer's:

Twenty-five sight records of gulls up to and including the second-nuptial plumage show the normal brown, unpatterned primaries. Two unusual individuals were recorded. One, seen in December, 1938, at the age of 17 months by R. T. Peterson and J. J. Hickey, was reported as having black primaries with no mirrors. A 1939 bird at the age of 24 months, seen on Long Island by the writer on July 27, 1941, had black primaries with white mirrors. These observations, if correct, indicate that occasional individuals are precocious.

In the third-winter and third-nuptial plumages, half the birds have acquired black primaries; 17 with brown and 18 with black primaries have been recorded. One 29-month bird particularly noted by the writer had a white mirror on the outermost of its *brown* primaries, and primaries in the writer's possession from an unbanded bird found dead show this same character, which is shared by a few specimens in the American Museum of Natural History. The large proportion of brown-primaried third-year birds is at variance with Dwight's conclusions.

Fourteen birds in fourth-winter and fourth-nuptial plumages without exception had black primaries, as did all birds of greater age.

UPPER TAIL-COVERTS

Dwight makes no mention of the upper tail-coverts, and Forbush merely mentions that they are white in the adult. The writer, however, believes that, if the relatively few data available can be considered representative, this is one of the more reliable age criteria. In first-year gulls the upper tail-coverts are dark brown barred with buff (see Plate 5, upper figure), and in adults they are pure white. In the transition stages, both types of feathers occur together as the white coverts replace the barred ones.

¹ Subsequent references to this work are undated.

When Herring Gulls are observed at close range it is possible to note readily the feather pattern of the upper tail-coverts, although at a considerable distance the distinction between tail and tail-coverts is often obscure. Since no provision was made on the Gull Survey cards for recording this item specifically, and since it is apparent that most observers failed to distinguish between tail and tail-coverts, only the writer's records of tail-covert characters are here used.

Four records of first-winter and six records of second-winter birds up to and including January (18 months old) show tail-coverts entirely barred brown.

It appears to be during the second prenuptial molt from March to May that the change from barred brown to white coverts is usually accomplished, although sometimes incompletely. Three February records of birds 19 months old show one bird with coverts barred brown, one with a few white feathers among the brown, and one with white coverts. Of three March and April birds (20 and 21 months old), one had white coverts and two had barred brown coverts; these last were the oldest birds observed without at least one-third of the covert area white.

One second-nuptial and fourteen out of the seventeen third-winter birds had entirely white coverts; the remaining three third-winter birds had white coverts with dark feathers covering 10% to 60% of the area.

One third-nuptial (35 months old) bird had a few dark covert feathers among the white, while five other third-nuptial and fifteen older birds had entirely white coverts.

MANTLE

The term 'mantle' is used to indicate those areas of the plumage which in the fully adult Herring Gull are pearl-gray—namely, the back and the upper surfaces of the wings, exclusive of the outer primaries. The feathers of the mantle are renewed twice each year. All possible intermediate stages are found between the juvenal mantle of dark brown feathers edged with buff and the completely gray mantle of the adult. The gradual changes and irregular patterns do not lend themselves well to accurate description nor simple analysis.

According to Dwight, first-year mantles are mottled brown, with suggestions of gray in the first-nuptial plumage. Increasing quantities of gray appear until the brown has essentially disappeared in the third-nuptial plumage. Forbush considered the first-winter mantle to be mottled grayish brown, second-winter "more or less pearly gull-gray," and adults "pale bluish-gray."

It seems simplest to present the field data on this character in tabular form (see Table 1). In the first-winter and first-nuptial plumages there are no gray feathers in the mantle. A considerable proportion of individuals acquire gray feathers, up to about half the area of the mantle, during the first post-nuptial molt. (In many individuals the gray feathers appear first on the upper back between the shoulders, and frequently this area is almost entirely gray while the remainder of the mantle is chiefly brown.) Completely gray mantles do not appear until, and completely brown mantles are not present after, the third-winter plumage. In the fourth-winter plumage, only an occasional bird is found with more than a trace of brown in the mantle.

TAIL

According to Dwight, the rectrices of first-year and second-year Herring Gulls are deep brown, with irregular white barring at their bases, particularly on the outer feathers. Third-year birds are described as having tails largely white, with varying amounts of dark smudging, "probably all white in a few birds," and fourth-winter rectrices are given as "snowy white." Forbush lists the tails of first-winter birds as mostly brownish black, of second-winter birds as "sometimes dark, sometimes light (when light with imperfect bar of dusky near end)," and of adults as white. Actually, the rectrices of young Herring Gulls appear wholly dark brown except for a narrow terminal edging of buff, since the basal four inches of the feathers, including the light markings mentioned by Dwight, are covered by the upper tail-coverts (see Plate 5, lower two figures), with only two and one-half inches of the rectrices remaining exposed. X

Many individuals develop white upper tail-coverts while retaining the brown tail, and in flight give the appearance of having a white tail with a terminal dark band. Peterson (1939: 72) states for field marks of the immature Ring-billed Gull (*Larus delawarensis*): "One of the best distinguishing features, aside from the size and the color of the legs, is the pattern of the tail. In the Herring Gull the tail terminates in a broad dark band that blends into the whitish color of the rump. The band near the tip of the tail of the Ring-bill is narrower and sharply defined." It is true that the actual rectrices of the Herring Gull never have a sharply defined band, but the sharpness of definition is not a reliable field mark since the "blending" area is covered by the upper tail-coverts, which often present just as sharply defined a contrast as in the Ring-billed Gull (compare the two lower figures of Plate 5). (It may also be pointed out that the legs of the first-year Ring-bills are pinkish as in the Herring Gull, not yellowish or greenish

TABLE 1
MANTLE FEATHERS

Plumage	Months Old	Writer's records	Gull Survey records	Other records
First-year July to July	0-12	4-100% brown 0-gray	39-100% brown 0-gray	—
Second-winter Aug. to Feb.	13-19	5-100% brown 8-part gray (7 up to 30%; 1 is 50%)	39-100% brown 26-part gray (up to 2/3)	9-100% brown 30-part gray ¹
Second-nuptial Mar. to July	20-24	1-100% brown 2-part gray (up to 80%)	—	0-100% brown 5-gray in mantle
Third-winter Aug. to Feb.	25-31	15-15% to 90% gray 4-100% gray	6-100% brown 12-part gray 12-100% gray	1-100% brown 24-up to 100% gray in mantle
Third-nuptial Mar. to July	32-36	3-80% gray 3-100% gray	—	—
Fourth-winter Aug. to Feb.	37-43	3-gray with traces of brown 11-100% gray	—	—
Fourth-nuptial and older	43+	2-100% gray	7-100% gray	—

¹ Numbers disproportionately high due to the obvious tendency of these observers to report the (supposedly) unusual.

TABLE 2
BILL COLORING

Plumage	Months old	Writer's records	Gull Survey records	Other records
Juvenal and first-winter July to Feb.	0-7	1—completely dark	23—all dark 5—base $\frac{1}{8}$ light 4—tip $\frac{1}{8}$ black	36—"black" or "all dark" 22—varying amounts (up to $\frac{1}{2}$) light, usually noted as basal 1—"black"
First-nuptial March to July	8-12	2—completely dark	2—all dark 1—base $\frac{1}{8}$ light	6—"dark" or "all dark"
Second winter Aug. to Feb.	13-19	12—basal 50% to 70% light, terminal 0% to 20% light, re- mainder of bill dark	4—all dark 21—base $\frac{1}{8}$ light 29—tip $\frac{1}{8}$ dark 1—straw, dark spot	65—part light, part dark (numerous variations)
Second-nuptial March to July	20-24	3—basal 65% light, tip 5% light, re- mainder dark	—	4—part dark, part light
Third-winter Aug. to Feb.	25-31	17—basal 50% to 70% light, tip 0% to 30% light, remainder dark. Two yellowish at tip	1—base $\frac{1}{8}$ light 12—tip $\frac{1}{8}$ black 9—"straw," "buff," "whitish," etc., with "dark spot"	13—part dark, part light 7—yellow, black spot 3—yellow, red spot
Third-nuptial March to July	32-36	5—yellowish, dark bar on both mandibles 2—yellow with red spot	—	—
Fourth-winter Aug. to Feb.	37-43	3—basally light, terminally yellowish without red or dark spot 10—same except dark spot on one or both mandibles 1—same except red spot 1—yellow with red spot	—	—
Fourth-nuptial June	47	—	—	—

TABLE 3
SUMMARY OF PLUMAGE AND SOFT PARTS (based on color-band records)

	<i>(Jus. and)</i> <i>First-</i> <i>winter</i>	<i>First-</i> <i>nuptial</i>	<i>Second-</i> <i>winter</i>	<i>Second-</i> <i>nuptial</i>	<i>Third-</i> <i>winter</i>	<i>Third-</i> <i>nuptial</i>	<i>Fourth-</i> <i>winter</i>	<i>Fourth-</i> <i>nuptial</i>
<i>How</i> <i>acquired</i> <i>Time of</i> <i>molt</i>	Partial molt Sept. to Dec.	Partial molt March to May	Complete molt August to Oct.	Partial molt March to May	Complete molt August and Sept. Brown or Black	Partial molt March to May Brown or Black	Complete molt August and Sept. Black	Partial molt March to May Black
<i>Primaries</i>	Brown	Brown	Brown	Brown	Brown to White	Brown to White	White, often with dark areas White	White, often with dark areas White
<i>Tail</i>	Brown	Brown	Brown	Brown	One-third to all white	White	White	White
<i>Tail-</i> <i>covers</i>	Barred brown	Barred brown	Barred brown	One-third to all white	One-third to all white	White	White	White
<i>Mantle</i>	Brown	Brown	Brown, often mixed with gray	Brown, usually mixed with gray	Brown to gray	Gray, often with some brown	Gray, some times traces of brown	Gray
<i>Head</i> <i>and</i> <i>neck</i>	Brown, streaked	Brown, streaked	Brown to whitish, streaked	Brown to whitish, streaked	Whitish, streaked; a few brown	White	White, streaked	White
<i>Breast</i> <i>and</i> <i>belly</i>	Brown usually mottled	Brown to whitish	Brown to whitish	Brown to whitish	White, often mottled; a few brown	White, often mottled	White, streaked on breast only	White
<i>Iris</i>	Dark	Dark	Dark to light	Dark to light	Light, rarely dark	Light, rarely dark	Light	Light
<i>Bill</i>	Blackish, often light basally	Blackish, often light basally	Dark with light tip and base	Dark with light tip and base	Light with dark bar, to adult	Light with dark bar, to adult	Light, usually yellowish	Probably adult

as in the adult Ring-bill, so that leg color is *not* a distinguishing point for young Ring-bills.)

For field data on the characters of the tail, the writer had to rely largely on his own observations since the Gull Survey cards did not stress the distinction between the upper coverts and the "base of the tail," and most observers apparently confused the two.

In the first and second winter and nuptial plumages, the tail (reference is made only to the exposed upper surface of the rectrices) is dark brown edged with buff. Reports of tails becoming whitish basally, or being largely white with a terminal band, arise from confusion of the tail and upper coverts.

In the third-winter and third-nuptial plumages, all possible variations are observed. The writer noted seven individuals in these plumages with completely dark tails, eight others with up to 50% white areas in the exposed rectrices, four with dark areas covering less than 50% of the exposed rectrices, and two with pure white tails. A total of 60 observations in this age group from all sources showed only eight birds (13%) with all-white tails. Dwight did not consider that third-year birds could have completely dark tails, but a considerable proportion do, and many others have the dark areas predominating. A third of the writer's observations fall into each of these two categories.

In the fourth-winter and fourth-nuptial plumages the tail is mostly white; the writer's data (no other reports available) show six birds having tails chiefly white with dark areas covering one-third or less of the exposed rectrices, compared to nine individuals with pure white tails. Dwight considered fourth-winter and older birds to be adult and to have snowy white rectrices, but a considerable proportion of the birds retain dark markings in the tail at this age.

Eight records of birds banded as adults show pure white tails.

HEAD, NECK, AND UNDER PARTS

The plumage characters of these areas are difficult to describe accurately. It may be obvious to an observer that one of two brownish immatures is considerably lighter than another, but there appears to be no satisfactory way of recording that information in such fashion that a third bird seen by a different observer will be known to be lighter or darker than either of the first two. Furthermore, the protracted semiannual molts, differences in pigmentation, and the effects of fading and wear produce all possible gradations from the darkness of juveniles to the white of adults, with much individual variation. The data, however, do confirm the tendency of the birds to become

lighter as they become older. In the following paragraphs the writer's data and the Gull Survey records are combined; the few other observations are unusable.

HEAD AND NECK.—According to Dwight, the head and neck are brownish streaked with whitish in the first winter, gradually becoming lighter until in the third winter these areas are white, thickly streaked, and in the third-nuptial plumage white, sometimes lightly streaked. Fourth-winter birds are listed as having white heads and necks, streaked with brown, and fourth-nuptial pure white. Forbush gives brown streaked with whitish for the first winter, lighter, more or less streaked, for the second winter, and white for the adult, streaked with gray in the winter.

In the first-winter and nuptial plumages there are records of thirty brown-headed individuals. Six others were recorded as having whitish heads and necks (four of which were specifically noted as streaked), which the writer believes are incorrectly classified and belong in the first group. In second-winter and nuptial plumages there are 35 records of brown, and 32 records of whitish, heads and necks, mostly noted as streaked in either case. Third-winter records show only four brown heads and 35 white or whitish, streaked. Third-nuptial records show seven individuals with white heads, only one of which was streaked. In the fourth-winter plumage, streaking reappears; all eighteen fourth-winter records show white heads and necks with streaks.

BREAST AND BELLY.—These feathers are rather evenly colored, so that streaking of these parts does not occur. However, the brown feathers are basally white and some are light-edged, so that some densely plumaged birds show a uniform brown coloration while others, on account of whitish feather edgings, molts, wear, feather disarrangement, or other cause, show a mottled effect. The winter-recurring streaks of the adult's white head and neck extend down onto the breast, but in the adult the belly remains white at all seasons. According to Dwight, the breast and belly are initially brown, more or less mottled, becoming lighter until in the second-nuptial plumage they are largely white, with brownish clouding, particularly in the mid-abdomen. In the third winter they are white, sometimes clouded with brown, and in subsequent plumages white. Forbush gives ashy-brown for the first winter, lighter, more or less streaked, for the second winter, and white for the adult.

Thirty-seven first-winter color-banded gulls were reported with brown under parts, 26 of which were noted as mottled. In the first-nuptial plumage, three brown and three whitish, mostly mottled, were

recorded. Second-winter birds showed 43 brown (mostly mottled), 18 whitish mottled, and four whitish or white (no mottling recorded). Second-nuptial birds showed two brown and three whitish, mostly mottled. Observations of third-winter birds yielded six brown (three mottled), 20 white, mottled, and 15 white (no mottling recorded). Seven third-nuptial birds had white under parts, some mottled. Fifteen fourth-winter birds showed white under parts, unmarked on the belly but streaked on the breast.

COLOR OF THE LEGS

Dwight and Forbush classify the colors of the tarsus in different ages of Herring Gulls into various quite similar terms, such as pinkish or flesh-color. Due to partial color-blindness, the writer disqualified himself from making any personal records of this character. Eighty-six acceptable records were reported on Gull Survey cards, distributed as follows among the four color classifications provided on the cards: "fawn or flesh," 36; "pinkish buff," 23; "bright pink," 14; and "pinkish white," 13.

No consistent age or seasonal variation in the color of the tarsus was revealed by these data. This indicates either that the leg color of Herring Gulls is indiscriminately variable within the range of the color classifications listed, or that these classifications are so closely similar that different observers, noting leg color under various conditions of observation, and lacking a standard color chart for comparison, cannot, as a group, classify their observations accurately and consistently into these categories.

COLOR OF THE EYE

At all ages the pupil of the eye is so dark that it appears black. The iris is dark brown in downy young birds, indistinguishable from the pupil even with the birds in the hand, and grows lighter as the bird matures, becoming pale yellow in the adult. According to Dwight, the iris is dark brown during the first year, either dark or light during the second year, and light (yellowish) thereafter. Forbush gives the iris as brown in the first winter, and "silvery-white to pale yellow" in the adult. It is interesting to note that the iris of adults in the other North American race, *thayeri*, has been reported as pale brown (see Brooks, 1937; Shortt, 1939; Shortt and Peters, 1942). Witherby (1941) gives the iris of adult *argentatus* as "very pale lemon."

The Gull Survey cards provided the alternatives of iris "brown" or "yellow." Records submitted by letter reported the irides as "brown," "dark," "yellow," or "light." The writer's records were classified

into four groups: "dark as pupil," "slightly lighter than pupil," "much lighter than pupil," and "very light." In the following summary, "brown" and the writer's first two categories are classed as dark; "yellow" and the writer's second two categories, as light.

All of the 74 records of birds from four to twelve months old showed dark irides.

Among 157 birds thirteen to twenty-four months old, 108 (69%) had dark irides, and 48 (31%), light. Records within this age group are scattered and show no trend with season or age. One anomalous individual seventeen months old (December of second winter) was noted by O. K. Stephenson, Jr., to have one iris brown and one iris yellow!

Of the 66 gulls from twenty-five to thirty-six months old, 59 (89%) were reported as having light irides. Two of the seven reported with dark irides were particularly noted by the observers as "very dark birds." They did not show any abnormal backwardness in plumage characters, but were probably excessively pigmented individuals. Four of the five others were reported by a single observer, and may represent unusual interpretation of observations.

Twenty-three gulls from thirty-seven months old to fully adult were, without exception, reported as having light irides.

COLOR OF THE BILL

The pattern and coloration of the bill follow a continuous sequence of complicated changes, subject to individual variation, from the bill of the downy young, entirely blackish excepting the light extreme tip, to the breeding adult's bright yellow bill with a red spot in the lower mandible near the gonys. According to Dwight, during the first two years the bill is blackish with the base and extreme tip pale, and with the basal light area increasing in extent in the second year, becoming somewhat yellowish by the second nuptial season. In the third year, the bill is dull yellowish with a dark band of variable extent at the gonys, the dark band disappearing and the red spot of the adult starting to appear in some individuals. Fourth-year birds have yellowish bills with red gonydeal spot, brighter in the breeding season than in winter. Forbush lists the bill as "flesh-colored, blackish toward tip" in the first winter, and "yellow with transverse spot of red above angle of lower mandible" for breeding adults, duller in winter adults. Regarding *thayeri*, Brooks (1937) states: "Up to the time Thayer's Gulls leave the British Columbia coasts, which is some time about the end of April, they can be told from American Herring Gulls in life by their paler yellow or greenish bills, not the deep yellow bills of the last named form."

Data from the color-banding program are condensed in Table 2. During the first year a majority of the birds have bills essentially 100% blackish, while a sizable minority have light areas at the base and tip of the bill. The light areas are described by most observers as "pinkish" or "flesh-color."

During the second year, most (? = all) gulls acquire extensive light basal areas and light tips to the bill. The dark area sometimes extends from the gonydeal region in a thin line along the commissure to the gape.

In the third year, the light basal and terminal areas are extended, and many birds appear to have a light bill with a dark bar on both mandibles at the gonys; the general pattern differs but little from that of the adult Ring-billed Gull, although Dwight states that the edges of the band are sharply defined in the latter species and not so in the Herring Gull. Also, the light areas in the Herring Gull bill at this stage are pinkish, not yellow as in the adult Ring-bill. In some birds the bills become yellowish, apparently first near the tip, and the dark bar recedes from the upper mandible, then from the lower, where a red spot remains. A few birds apparently develop adult bill characters in the third year.

Fourth-year birds have bills yellowish, at least terminally, which vary from apparent third year to adult.

SUMMARY AND CONCLUSIONS

Several hundred field descriptions of the plumage and soft parts of the Herring Gull, ranging from fragmentary to fairly complete, have been reviewed. In each case the age of the bird under observation was known from the colored leg-bands which it carried.

(1). Correlation of variations in plumage and soft parts with age is discussed in detail. The results are summarized in Table 3.

(2). No differences could be noted among birds from the various breeding colonies at which color-banding was conducted.

(3). The writer believes that in most cases it is impossible to determine accurately the age of a Herring Gull, either in the field or as a museum specimen, by the pattern and color of plumage and soft parts, since practically every normal combination of these characters can be assumed in two different years.

(4). Dwight's reference specimen JD 53,177 (England) is actually *Larus fuscus*.

(5). The results of this study of living gulls differ in the following points from Dwight's analysis based on museum specimens:

- (a) About half the third-year birds have brown primaries, whereas Dwight lists only black for this age;
- (b) Data on upper tail-coverts, omitted by Dwight, are here presented;
- (c) Many third-year birds have the exposed rectrices wholly brown;
- (d) Many fourth-year birds have dark areas in the tail;
- (e) Dark feathering of the under parts in the third year is more frequent and more extensive than Dwight indicates.
- (6). Forbush's descriptions of plumage require correction in the following points:
 - (a) Second-winter birds have plain brown primaries as in the first year, without white markings;
 - (b) There is less gray in the second-winter mantle than Forbush implies;
 - (c) The tail is not light in the second year;
 - (d) In first-year birds the bill is usually chiefly blackish.
- (7). Bent's analysis of plumage (1921) assigns to second-year and third-year birds plumages that are actually those of the third and fourth years respectively.
- (8). Neither the sharpness of definition of the tail-band nor the color of the legs is a satisfactory field character for distinguishing young Ring-billed from Herring Gulls.
- (9). The colors of eye and bill of *thayeri*, not determinable from skins, have been found by other writers to differ noticeably from those of *argentatus*.

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MIDSUMMER WANDERING OF CERTAIN ROCKY
MOUNTAIN BIRDS

BY FRED MALLERY PACKARD

THE habit of certain species of birds to leave their natal habitat in midsummer and to appear in numbers at that season in distant regions is well known. It is especially noticeable in the eastern states, where egrets and other southern herons may be found in August and September in the marshes of New England and Ontario, and young gulls and terns far north of their natal range.

This midsummer wandering is obviously distinct from any actual migratory movement, and apparently has never been explained satisfactorily. There is reason to suspect, chiefly on the basis of banding records, that these wanderers are young birds of the year, but whether their movement represents a foraging activity due to overcrowding of the natal area (which seems unlikely), a preliminary 'stretching of the wings' in preparation for the birds' initial migration, or some other factor is uncertain.

Another type of midsummer wandering, which may be allied to this northward movement, is shown by the occurrence of western species, such as the Arkansas Kingbird and the Clay-colored Sparrow, in the eastern states at that season. Banding records suggest that some of these birds, too, are young of the year, although adults apparently are also involved.

The term 'post-natal wandering' may be used to describe the movement of young birds away from the regions in which they were raised and after they have left the nest. When adult birds leave the nesting area after the young have fledged, and spend an appreciable period of time in a region where they do not nest and through which they do not actually migrate, the term 'post-nuptial wandering' might better be employed. A bird that appears casually in summer outside the normal range of its species may properly be included in either of these categories although its activity may be erratic and not usual in the behavior of the species.

True migrations involve the entire population of a given species in a given area, whereas the habit of midsummer wandering appears to affect only a portion of the population. Although some of these wandering individuals may gather into small flocks and perhaps remain together for the fall migration, their departure for their winter range occurs later in the season, and often begins after the birds have returned to the vicinity of the nesting range.

Observation of the birds in Rocky Mountain National Park, Colo-

rado, during 1939 and 1940, revealed that midsummer wandering is a regular pattern in the behavior of some Colorado birds. Instead of representing a considerable horizontal movement, however, it takes place as a wandering to elevations higher than the nesting habitat. The variation in habitat from the great plains to the crest of the continental divide, a distance of about fifty miles, is as great as that resulting from a shift of hundreds of miles over level country.

It is regretted that naval duties during the past few years have made it impossible for me to investigate properly, in preparation for this article, the abundant literature extant about the altitudinal migrations of birds. Such time as could be devoted to this purpose, and conversations with other ornithologists who are more thoroughly familiar with the literature on the subject, led to the belief that this upward wandering of birds in high mountain areas has not been discussed before, certainly not in such a way as to attract the attention of students to the subject.

A check-list of "The Birds of Rocky Mountain National Park, Colorado," published by the writer in the *Auk*, July, 1945, discussed briefly each of the 215 species recorded from that park. In that paper were presented nesting and migrational data, including dates and elevations of occurrence, a comparison with conditions in adjacent regions, the relative abundance of the birds at different seasons, and other information summarizing generally what is known about the birds of the area. From that list have been selected twenty-two species that exhibit evidence of performing the altitudinal wandering with which this paper is concerned.

To gain a clear conception of this phenomenon, some knowledge of the nature of the terrain is necessary. The Front Range of the Rocky Mountains and the adjoining foothills is an unusually favorable region in which to study the movements of birds in relation to altitude. The entire range is included within the national park, where complete protection is afforded wildlife and where interference with normal behavior patterns resulting from human activity is negligible. The single paved road that crosses the range rises to 12,000 feet, so that all of the life zones are easily accessible, while trails lead to many other parts of the park. The foothills, which extend thirty miles eastward of the park boundary to the edge of the plains, are mostly included within the Roosevelt National Forest.

The prairies that cover the eastern half of Colorado sweep gradually westward to an elevation of 5,300 feet before they terminate abruptly against the foothills. There the short grasslands give way to the ponderosa pines and junipers of the Transition Zone, where the trees

grow in open stands over the canyoned hillsides. This rough, rocky country rises westward to 7,500 feet. There the canyons open into a region of long glaciated meadows, locally called "parks," where small ranches and recreational settlements have been established, the major community of which is Estes Park. The national park boundary lies at about 7,800 feet, above Estes Park.

Each mountain park includes one or more meandering streams, bordered by thickets of willow and alder and narrow groves of aspen. Ponderosas cover the moraines and bordering slopes, except where sizable stands of aspen have grown over ancient burns, scars or favorably moist areas. This open forest extends to the western limits of the meadows at 8,500 feet, where suddenly increasing gradients mark the beginning of the true mountains.

Between 8,500 feet and 10,000 feet these slopes are densely forested with small lodgepole pines, growing so thickly as to be almost impenetrable in places. Here, too, groves of aspen cover old seres or border streams as they drop down the towering canyons. Few shrubs grow in this area, and a limited number of herbs. This belt comprises the Canadian Zone.

The Hudsonian Zone is a narrow band of Engelmann spruces and alpine firs, growing from 10,000 feet to timberline at 11,000 feet. These trees form open, sunny glades, with many flowers and shrubs, which are especially abundant near the springs and the small streams that descend from them.

A fringe of limber pines and dwarfed spruces marks the upper limit of trees. Above 11,000 feet, vast rolling tundra and frequent talus piles form the Alpine Zone, a wilderness of crags and granite peaks. This is the crest of the Front Range, part of the continental divide, a ridgepole bisecting the park.

Westward of the divide, the slopes descend rapidly to form the eastern wall of the Colorado River valley. The river, itself, is here a small stream meandering over the valley floor, a morass of beaver ponds, with abundant willow and aspen. Below 9,000 feet the ponderosas again appear as a close hillside cover. The stands of pine become less dense below Grand Lake village, and at about 8,500 feet the dry sagebrush basins of the Upper Sonoran Zone become the dominant feature of the landscape.

The habit of wandering to these altitudes in summer after the nesting season appears to vary among the species of birds concerned, grading from a mere hint of its occurrence in the erratic appearance of a bird above its normal range to a conspicuous invasion of higher elevations at that season by other species. There is, however, some uniformity

to be noted among species of the same family. In a few cases it has been demonstrated that these wanderers are birds of the year; more often, however, field observations alone were not sufficient to determine the age of the birds involved. The species discussed below are arranged in the order followed in the A. O. U. Check-list of North American Birds, Fourth Edition, 1931.

Although Treganza's Herons (*Ardea herodias treganzai*) migrate through the park in spring and fall at elevations below 9,000 feet, and are common on the plains near the foothills, there are no summer records from the park. The Black-crowned Night Heron (*Nycticorax nycticorax hoactli*) has been recorded but once in the national park, on July 28, 1940, when a young bird was seen at Mary's Lake, 7,800 feet. This heron was probably raised in one of the colonies on the prairies a few miles east of the foothills.

Marsh Hawks (*Circus cyaneus hudsonius*) do not nest in the park but appear in numbers above timberline from August 1 to September 15. These birds are in the brown plumage of the females and young. The true fall migration occurs between October 1 and 18, and most of the migrants fly at lower elevations.

Prairie Falcons (*Falco mexicanus*) nest in the park up to 9,500 feet, possibly higher. In August they forage over the alpine meadows before departing in September and early October.

Sparrow Hawks (*Falco sparverius sparverius*) nest abundantly in the lower foothills, a few pairs as high as 8,200 feet. After the nesting season they become more common throughout the upper Transition Zone, and a few range up to timberline. In September and October they descend below 8,500 feet to migrate from the region.

Avocets (*Recurvirostra americana*) nest abundantly on the plains near the foothills, and the occurrence of one in the park at 8,200 feet on July 31 (year uncertain) probably represents a post-natal wanderer.

Western Mourning Doves (*Zenaidura macroura marginella*) are much less common in the mountains than they are in the Denver region, but a number of pairs nest in the aspens and ponderosa pines of the Transition Zone up to 8,500 feet. In late summer their numbers increase throughout the open parks, and occasionally doves may be seen then at timberline. They leave the national park in September.

Of the eight species of woodpeckers that occur in the national park, six nest within its boundaries. The Western Red-headed Woodpecker (*Melanerpes erythrocephalus caurinus*) nests on the plains and probably in the lower foothills up to about 6,000 feet. During the nesting season a few males, probably non-breeding birds, may be found as high as 9,000 feet. An occasional Red-headed Woodpecker visits the park in

July and August; it is possible that these individuals are post-natal or post-nuptial wanderers, but if so, the habit is not strongly established in the species.

The summer wandering habit appears to be more regular in the Lewis's Woodpecker (*Asyndesmus lewis*). This species breeds abundantly in the lower foothills to the east, at least as high as 6,800 feet, and also in the Upper Sonoran region south of Grand Lake. A very few visit the park boundaries in May, but in August they occur frequently throughout the Canadian and Hudsonian Zones, singly or in flocks, and have been found as high as 12,100 feet. In September, these birds leave the park, some descending eastward to the foothills and plains, while the rest migrate down the Colorado Valley to the west.

The kingbirds exhibit the summer wandering pattern more conspicuously than any other group of birds. Eastern Kingbirds (*Tyrannus tyrannus*) migrate along the foothills in numbers in spring, and a few pass through the mountain meadows of the upper Transition Zone at that season. When the nesting is over in the foothills, Eastern Kingbirds again appear in the mountains, becoming fairly common along the streams up to 8,500 feet in late August and early September. They leave the park by about September 8, presumably joining others of their species at lower elevations for the southward migration.

There is but one spring record of the Arkansas Kingbird (*Tyrannus verticalis*) in the park files, dated May 25, 1938, but otherwise this species follows a behavior pattern similar to that of the Eastern Kingbird. The Arkansas Kingbird is perhaps slightly more common in the upper Transition Zone during late August than is the Eastern Kingbird, but both leave the park at about the same time.

Cassin's Kingbird (*Tyrannus vociferans vociferans*) has not been reported from the park since 1890, and nothing is known of its habits there at that time. Say's Phoebe (*Sayornis saya saya*) occurs in the park only in fall. Occasional individuals have been found up to 8,200 feet between September 9 and October 6 which are probably true migrants. None of the seven other species of flycatcher on the park list, all of which are common breeders there, exhibit the habit of ranging to higher elevations in midsummer.

Long-crested Jays (*Cyanocitta stelleri diademata*) nest commonly in the ponderosas of the upper Transition Zone and in some numbers in the dense stands of lodgepole pines and aspens that cover the moraines and slopes of the lower Canadian Zone. Their regular appearance in the Hudsonian Zone in late summer may be due to altitudinal wandering. They winter from 9,000 feet to the plains.

American Magpies (*Pica pica hudsonia*) nest in varying numbers to the lower edge of the Canadian Zone. In September and October, small flocks appear on the alpine meadows, but descend with the first snows to winter below 9,000 feet.

Cañon Wrens (*Catherpes mexicanus conspersus*) are known to breed in the park only on Needles Ridge near the eastern boundary, where nests have been found up to 8,500 feet. They are rather sedentary birds and some of them appear to remain near their nesting sites in the park during winter. Cañon Wrens have been discovered as high as 10,500 feet in summer and autumn on mountain slopes above their nesting habitat.

Western Robins (*Turdus migratorius propinquus*) nest abundantly throughout the forests of the park to timberline. They may be observed flying across the alpine meadows at any time between May and November, but they are more numerous at the higher elevations in late summer than at other seasons. It is suspected that at least some of these birds are individuals that nested farther north and are migrating south earlier than the local population, for many of them are adults.

Mountain Bluebirds (*Sialia mexicana bairdi*) are the most prominent breeding species of the mountain parks, and although the Canadian Zone provides little habitat suitable for their nests, they nest also in fire-burned stubs near timberline. After the young are fledged, many visit the alpine tundra until late September and October, when they descend to lower elevations to undertake the southward migration.

The discovery of a Western Yellowthroat (*Geothlypis trichas occidentalis*), a species that nests below the park boundaries, at 12,000 feet on the continental divide on September 13, 1939, was probably an observation of an erratic variant from the normal behavior of the species.

Western Meadowlarks (*Sturnella neglecta*) nest in small numbers in the open meadows of the upper Transition Zone, and more abundantly in the lower foothills and on the plains. In late summer, they increase in numbers through the mountain parks and may even be found then above timberline. They leave the mountains in September and early October.

Yellow-headed Blackbirds (*Xanthocephalus xanthocephalus*) nest commonly from the plains to about 5,500 feet in the foothills, rarely as high as 6,000 feet. Small flocks range slightly higher in August, occasionally to 7,500 feet.

The Rocky Mountain Grosbeak (*Hedymeles melanocephalus melanocephalus*) nests in moderate numbers below 8,500 feet, and rarely may

be seen as high as timberline in summer. The species departs by the end of August.

On August 19, 1940 a young Green-tailed Towhee (*Oberholseria chlorura*) was seen at 11,500 feet on Tanima Peak. The species nests abundantly throughout the Transition Zone, but is occasionally found higher in summer.

Lark Buntings (*Calamospiza melanocorys*) have been found in the park only in August, during which month a few flocks have been observed as high as 12,300 feet. They nest abundantly on the prairies and in the lower foothills up to 6,000 feet.

Western Lark Sparrows (*Chondestes grammacus strigatus*) nest in numbers on the plains and lower foothills, and also near the western boundary of the national park near Grand Lake. A considerable number of them, mostly young birds, wander into the Estes Park region from the eastern nesting range, and a few visit the alpine meadows of the continental divide at that season. The park elevations are above their usual migration routes.

These notes are necessarily inconclusive, but they demonstrate that altitudinal wandering is a more or less regular habit of mountain birds and suggest the desirability of further investigation of the phenomenon. It would be interesting to know whether this activity takes place in other mountainous areas, and if so, to determine what species are concerned and to what degree. The fact that so many different land birds appear to engage in midsummer wandering in the Rocky Mountains raises speculation whether the northward wandering of the birds in the eastern states is actually common among birds other than herons, gulls and terns, as careful analysis of banding records might demonstrate. The collection of specimens of these wandering birds would be useful in order to determine the ages of the birds involved.

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NEWLY HATCHED EASTERN NIGHTHAWK WITH EGGSHELLS AND UNHATCHED EGG.

NOTES ON THE DEVELOPMENT OF THE NIGHTHAWK

BY C. DAVID FOWLE

Plate 6

IN the course of field studies conducted during the summer of 1943 at Campbell River, Vancouver Island, British Columbia, a series of observations was made at two nests of the Eastern Nighthawk, *Chordeiles minor minor* (Forster). Both nests were found on an extensively logged and severely burned area characterized by an almost entire absence of tree cover. Ground cover consisted mainly of bracken fern (*Pteris aquilina* var. *lanuginosa* Bong.), trailing blackberry (*Rubus macropetalus* Dougl.) and other plant species characteristic of the early successional stages.

The nests were placed on small patches of sandy gravel surrounded by a scattered debris of dry vegetation and decaying wood in the shade of sparse stands of bracken. Nest 1 was found on July 1, at which time it contained two eggs, the smooth glossy surface and pale color of which indicated that they were in a fairly advanced stage of incubation. When the site was revisited on July 17, two chicks, judged to be about five days old, were found two feet from the egg shells.

The remainder of the observations were made at Nest 2 which was found on July 12. At this time it contained only one egg, but by July 14 the parent bird was brooding two darkly pigmented and dull-surfaced eggs. By the 26th, however, the eggs presented a more 'washed-out' appearance and their surfaces had become glazed.

A visit to this nest at 7:30 a. m. on July 30 revealed that one egg had hatched. The shell was broken around the short circumference into two almost equal halves which were found lying together beside the chick (Plate 6). A small portion of the shell remained clinging to the nestling's back. The second egg hatched the next morning at 7:30 when the young bird was found still moist and struggling to free itself from the shell. Again the egg was broken neatly into two halves.

Here it will be seen that the incubation period was eighteen days. The one-day lag between the hatching of the first and second chicks suggests that the former probably developed from the first egg laid.

On July 31, the older chick was marked with indelible ink to distinguish it from its nest-mate.

The nestlings were sparingly covered with soft down. The mid-dorsal and latero-lumbar areas were bare and very darkly pigmented. This general area was bounded by scapular and caudal pterylae of dark gray down. The flanks, however, were somewhat paler and

faded into the creamy pigmentation of the ventral down. The younger chick was paler than the older.

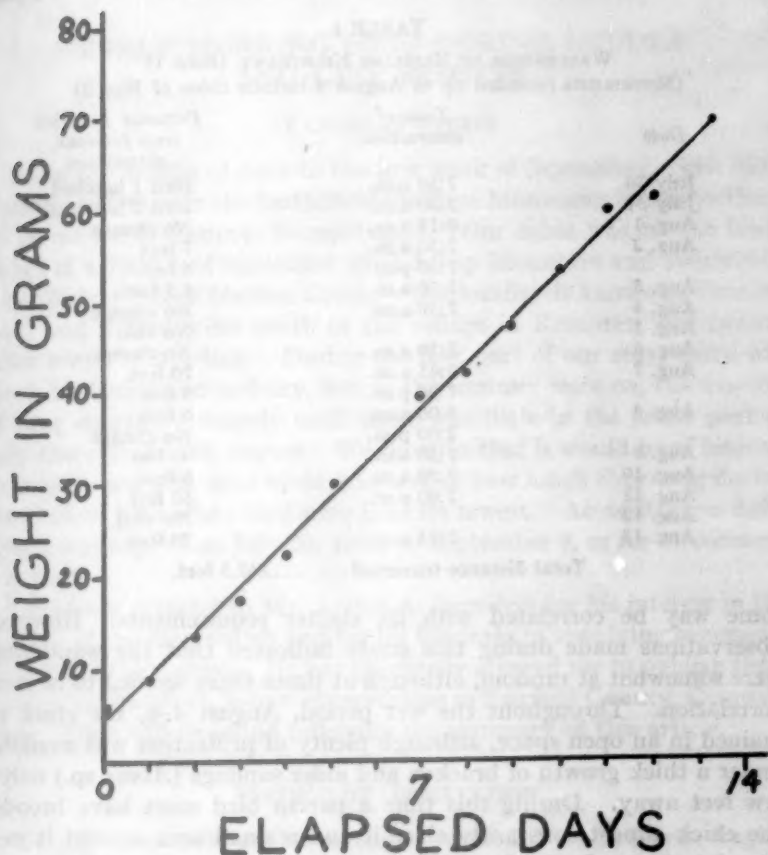
Unfortunately, on August 3 the younger nestling died when it became entangled in a runner of trailing blackberry. The remaining chick continued to develop rapidly.

By August 4, pin feathers were beginning to appear along the wing and scapular tracts. By August 6, distinct pterylae were visible on the crown and shoulder, on the rump, and along each side of the breast and abdomen. The following day a few of the feather sheaths on the shoulders and the crown opened to reveal the tawny tips of the developing feathers. By August 10, feathers were showing on the wings and the sheaths of the scapular tracts were nearly all open so that the feather tips almost covered the bare mid-dorsal region. The caudal sheaths started to open on August 11, and the darker primaries were partially unsheathed by the 13th. Feathers appeared on the throat by August 11 but the breast and abdomen remained clothed in down.

Throughout the period of observation the birds were weighed almost every morning. The growth of the older chick (Bird 1) is represented graphically in Text-figure 1. It weighed 6.1 grams at hatching and by the time it was two days old it had doubled its weight. At the end of thirteen days it was eleven times as heavy as at time of hatching. The younger nestling (Bird 2) weighed less when hatched—only 5.8 grams. Moreover, it gained weight more slowly than Bird 1. By the morning of its third day it had gained only 2.7 grams as compared to its nest-mate's 8.4 grams. This discrepancy in growth may have been due to the greater vigor of Bird 1 and its superior ability to obtain food from its parents.

It is of interest to note that during a period of severe wet weather extending from the night of August 4 through the 5th and 6th, when insect food was probably scarce, there seems to have been no decrease in the rate of growth of Bird 1.

Immediately after hatching, both chicks were active and capable of holding up their heads and moving them from side to side. Occasionally they would utter a soft *peep* when handled, but more frequently they remained silent. When about forty-eight hours old they were able to move about quite actively. They usually made some effort to escape while being weighed and frequently managed to move from six to twelve inches before they were recaptured. When on the ground or when handled, Bird 1 usually kept its eyes partially closed. After the third day it frequently opened its eyes, raised its wings, and squeaked if handled at all roughly. When left by the adults, both nestlings remained motionless with their necks extended and pressed to the ground. This was the characteristic behavior of



TEXT-FIGURE 1. Growth curve of young Eastern Nighthawk.

Bird 1 until it was ten days old, after which time it usually maintained a more alert position with the head raised. However, if suddenly disturbed, it would lower its head and remain motionless.

Throughout the fourteen-day observation period, Bird 1 wandered considerably. Some idea of the chick's activity may be obtained from Table 1. Here the distances traversed between the times of observation are set down. It will be noted that the nestling moved almost every day after it was two days old, with the exception of August 4, 5, and 6, when severe weather prevailed.

At no time while observations were being made was Bird 1 seen to move more than one to two feet at a time. Whether the more extensive excursions were made in a series of small steps similar to these or whether they were accomplished in one effort is not known.

It might be expected that the wanderings of the nestling might in

TABLE 1

WANDERINGS OF NESTLING NIGHTHAWK (BIRD 1)
(Movements recorded up to August 4 include those of Bird 2)

Date	Time of observation	Distance traversed since previous observation
July 30	7:30 a.m.	Bird 1 hatched
July 31	7:30 a.m.	Bird 2 hatched
Aug. 1	9:15 a.m.	No change
Aug. 2	7:30 a.m.	7 feet
	7:30 p.m.	6 feet
Aug. 3	7:30 a.m.	1.5 feet
Aug. 4	7:30 a.m.	No change
Aug. 5		No visit
Aug. 6	7:30 a.m.	No change
Aug. 7	9:45 a.m.	70 feet
	7:00 p.m.	6 feet
Aug. 8	8:00 a.m.	6 feet
	2:00 p.m.	No change
Aug. 9	7:30 a.m.	90 feet
Aug. 10	7:30 a.m.	6 feet
Aug. 11	7:00 a.m.	50 feet
Aug. 12		No visit
Aug. 13	7:15 a.m.	20 feet

Total distance traversed 262.5 feet.

some way be correlated with its shelter requirements. However, observations made during this study indicated that the wanderings were somewhat at random, although at times there seemed to be some correlation. Throughout the wet period, August 4-6, the chick remained in an open space, although plenty of protection was available under a thick growth of bracken and alder saplings (*Alnus* sp.) only a few feet away. During this time a parent bird must have brooded the chick almost constantly since it and a small area around it were found to be perfectly dry while the surrounding soil and litter were saturated by the heavy rains. On hot days when the temperature was above 80° F., the nestling was usually but not always found in the shade of the bracken.

After August 13, the nestling could not be found in spite of an extensive search. Whether it fell prey to a predator or wandered into such dense cover that it could not be found is not known. In any case, it is unlikely that it could have taken wing owing to the underdeveloped state of the plumage at this time.

I wish to acknowledge the assistance of Mr. J. L. Baillie, Jr., of the Royal Ontario Museum of Zoology, in checking the manuscript of this paper.

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EARLY MORNING SONG DURING MIDDLE AND LATE SUMMER

BY CHARLES VAURIE

FROM the middle of June to the first week of September, 1944, Mrs. Vaurie and I were in the foothills of the Blue Mountains in the northern corner of Berks County, Pennsylvania. Our cabin was on the lower slopes of a 1000-foot hill called Round Top Mountain and overlooked a small river called Maiden Creek. The locality is known as Greenwald and is two miles south of the village of Kempton and twenty miles north of Reading. During the first part of our stay, there was much bird song and activity, but as the summer wore on, the amount of song decreased sharply until there was little in the latter part of July and even less in August. We thought that it would be of interest to keep a record of what birds sang and of how much they sang during the time of year when bird song is at its lowest. Accordingly a daily record was kept from July 20, 1944, to September 4, or for 47 consecutive days.

I am very grateful to Mr. Aretas A. Saunders for his interest in the reading of the manuscript and for his kindness in supplying comments on some of the species. He has graciously allowed me to publish these comments, based on recent observations in Fairfield County, Connecticut. They will be found following the summary of this article.

METHOD OF OBSERVATION

We got up at 5:30 A. M. or earlier, recorded all the birds singing around the cabin, and soon after breakfast went for a set walk of a little over one mile, usually returning at 8:00 A. M. when the period of observation would end. The birds, the amount of song, the temperature and the state of the weather were noted and were transcribed later onto a chart. This unfortunately resulted in a large unwieldy table which does not lend itself readily to publication.

The amount of song was recorded under four terms which are used throughout this paper and are to be understood as expressing quantitatively only the meanings I give them, as follows:

Very abundant—continuous full song with only normal intervals.

Abundant—singing very often and very noticeably but not continuously.

Moderate—singing noticeably but with fairly long pauses.

Occasional—singing in short snatches at long intervals of ten to fifteen minutes.

Only the birds that were seen regularly in the limits of the area covered and which are therefore assumed to be residents were included in this study. Most of the individuals had established territories and were to be found almost always on the same singing perches. In the case of some species—Blue Jay, Crow, Titmouse, and at the beginning the Goldfinch—the birds had no set locations but wandered through the area. Under each species is given the maximum number of individuals seen or heard on any one morning. Although it was not our purpose to hunt nests, we found the location of quite a number, and it was fairly easy to get a count of individuals. These numbers are given in parentheses after the names of the species. In some cases the numbers given are only estimates and are therefore indicated by a \pm sign. Since the same area was covered for 47 consecutive days, these estimates should be more than averagely correct. A few records of singing birds taken at other hours or outside of the area have been included where they seem relevant.

THE AREA COVERED

The area covered in this study consisted of the surroundings of our cabin, a short stretch on a dirt road, and a longer one along a railroad track; both the road and track saw hardly any traffic. Altogether, our measured walk was a little over one mile. The cabin and the land around it had long been abandoned to weeds and many bushes and tangles of brush and young trees were reinvading the once cleared land. These tangled masses provided excellent cover for birds. A large screen of evergreens and larches grew on one side of the cabin while on the other was a gully fed by a very abundant spring which flowed into nearby Maiden Creek. Ancient willows grew by the spring, and around the cabin were a few other large trees such as hickory, ash and mulberry.

Both banks of the creek were thickly bordered by tall, full-grown trees, of which plane trees (sycamore), hickory, oak and linden were the dominant species, with a smaller number of ash, ironwood, elm and hemlock. The railroad track ran on an embankment above the creek. On the landward side of the track were some weedy stretches, two cultivated fields, and some abandoned meadows with clumps of sumac, thorn, and wild grapes. The train passed but three times a day and disturbed the birds very little, while the double line of telegraph wires provided them with convenient and much-used perches.

THE WEATHER

Daily recordings were kept of the temperature, wind, and state of the weather; the temperature was taken usually at 6:30 A. M. before we set out on our walk.

The period of observation was preceded by a long drought. This drought continued practically unbroken throughout the 47 days of observation during which time it rained only five times, with three of these rains being very light. In fact, so dry was the summer that the local crops of corn and potatoes failed.

The majority of the early mornings were hazy, sometimes very much so, and there was little air movement; the latter was recorded only eleven times, and on eight of these there were but faint breezes. We had no way to measure humidity, but, even though the days were very dry, the humidity seemed rather high in the early morning, perhaps due to the lack of air movement in our river bottom. During the cold wave mentioned below, the early mornings were clear and dry.

The temperature at 6:30 A. M. ranged from 58° to 69° F., with the average at 62.14°, up to the 19th of August when it dropped to 51°. The following day it was down to 43° and on the 26th and 27th it was only 40°. The cold wave lasted until the 31st, and during these thirteen days the average was 50.7°. On the first of September the thermometer began to rise again to the level of the first period.

During the period of our observation up to the arrival of the cold spell, the weather was so remarkably even that every morning was a replica of the preceding one. The almost total absence of rain and wind and the evenness of the temperature were ideal for our study as we can assume that the amount of song and activity of the birds were not influenced by the weather until the cold snap came. At that time, the already very small amount of song was still further reduced, and on August 26, when it was only 40°, only two species out of twenty-one were heard. On the following day, only one species was singing *very abundantly*, while four others sang *occasionally*. As the thermometer began to rise again there was a slight increase in song.

THE RECORDS

MOURNING DOVE (6).—During the first twenty-one days up to August 10, the birds were heard on thirteen days, with the average of song *moderate*, except that on July 20 and August 6 the amount was *very abundant* and on three days *abundant*. On August 10, one of these birds began a remarkable series, singing incessantly all that day. On the following day it was hardly heard, but during the next five days it almost never stopped. All the singing was done from one perch. On the five following days (August 17–22) the doves sang *abundantly* on three days and not at all on two. After August 22, they sang only *very moderately*.

The Mourning Dove was one of the earliest singers as well as one of

the latest. On July 26 it was heard at 5:05 A. M. (on the same day a Robin sang his awakening song before 5:00 A. M.). Doves sang also well past twilight. They were seen on every one of the 47 days. Their singing perches were the tops of dead trees or bare branches at the tops of living trees; also, but less often, the cross-bars and the wires of telegraph poles.

CRESTED FLYCATCHER (4).—These birds were silent during the first six days of observation; on the seventh (July 26) and again on July 28, 29 and 30, they were heard *occasionally*. Then followed a long period of silence of seventeen days. They again began to sing on August 17 and on 11 of the next 19 days (August 17 to September 4), they were heard with a *moderate* average.

The Crested Flycatcher was the only one of the species under observation which sang more toward the end of the period although almost silent at the beginning. It was seen every day.

EASTERN PHOEBE (6).—Arthur Cleveland Bent in 'Life Histories of North American Flycatchers, Larks, Swallows and their Allies' (Bulletin 179, U. S. Nat. Mus.), says on page 150: "The bird sings throughout the summer and well into the autumn." Not a day passed when we did not see all of our Phoebes along the creek but, with the exception of July 31 and August 2 and 3, when a few *occasional* calls were heard, we did not hear any song from them the whole of the 47 days of our observation.

EASTERN WOOD PEWEE (2).—Heard on 13 days on a *moderate* average. These days were scattered through the whole period and no pattern is evident. On August 21 and September 4, it was singing *very abundantly*. There were long periods, one of nine days and one of seven, when we did not hear our pewees at all. This does not necessarily mean that other pewees were not singing, for on almost daily visits at 3:00 and 7:00 P. M. to a neighboring bird a quarter of a mile away, where the woods were much denser, we found it singing *abundantly* or *moderately* on practically every occasion. Our pewees were partial to exposed telegraph wires as singing perches. They and the Field Sparrows were our most pleasing songsters.

NORTHERN BLUE JAY (6±).—A small band would visit us, coming down from the woods above. Up to August 5 (17 days), they were seen or heard *occasionally* on only four occasions; after that, up to August 24, they were seen and heard on 12 days out of 18 and during this period they were much noisier. From August 24 on, I have no records of them; they were either completely silent or, what is more likely, they had disappeared.

CROW (12±).—As in the case of the jays, my records are faulty, for I have no entries on Crows for the first ten days. I either failed to notice them or to consider their vocal efforts as 'song,' but they must have been there because from then on they were heard practically every day on a *moderate* average. They had a regular roost near our house in a small dead tree and periodically rediscovered a Broad-winged Hawk that lived near by—which resulted in a great clamor. The Crows would circle with the hawk and swoop at it repeatedly, one bird at a time, until the hawk had to disappear down into the trees, where it was never pursued. Although I observed this performance often, with and without field glasses, I never saw the Crow deliver a blow.

TUFTED TITMOUSE (6±).—A little group passed by, usually at intervals of a few days. They never sang, but kept up a *moderate* amount of chatter on their visits. After August 23, although seen on several occasions, they were always silent except once, on September 3.

HOUSE WREN (5).—On July 26, an individual arrived and sang on endlessly, all day, but was never heard again. On August 19 we discovered a pair in the willows near the cabin, and from then on heard them scold and chatter every day, but they never sang. The same was true of another pair that nested near the tracks. I do not understand why our two pairs did not sing, for a neighbor of ours, during the same period, had a pair with young in the nest, and this pair sang *abundantly* at all hours.

CATBIRD (12 = 6 pairs).—*Very abundant* singers daily until July 31. On August 1, an abrupt change took place and the birds were barely heard; the following day the song was resumed but only *moderately*. From August 3 on, no more song was heard at any time, only calls and scolds, although the birds continued much in evidence. As this observation concerns six pairs, this simultaneous cessation of song was very striking.

The Catbird is a remarkable singer and is not easily daunted when it feels the urge. The song is continuous at times for well over an hour. Once in complete darkness, after 9:00 P. M., a bird sang continuously for more than an hour. Another bird, during a violent thunderstorm at 3:00 P. M. on July 27, took its stand in a lilac bush near our porch and sang on uninterruptedly for half an hour through the heavy downpour. The bird was getting very wet and had to shake off the rain repeatedly, but the song poured out just the same.

ROBIN (4).—Only heard to sing *very abundantly* on the first day of the study (July 20). From then to August 14, they sang every day, with only one or two exceptions, but only on a *moderate* average. They

then became silent and were heard to sing only once more *occasionally* on the 18th. They remained in evidence to the end, but only called or scolded after August 18. As has already been mentioned, they were our earliest singers; they were heard to sing before 5:00 A. M., not only on July 26 but also on August 10.

RED-EYED VIREO ($5 \pm$).—These birds, noted for their very abundant singing throughout the summer months, did not sing in our territory the way they should have done. Although seen almost every day, they were heard to sing on only six days out of the 47, and only once *very abundantly*—on the coldest day, when it was only 40° F. From July 26 to August 17 (a period of 21 days), they were absolutely silent.

BLACK AND WHITE WARBLER (6).—These birds followed no noticeable pattern. They were not seen every day and were heard only on twelve days scattered throughout the whole period. Only twice, on July 28 and 29, were they heard to sing *abundantly*. The rest of the time they sang *occasionally*. The last songs heard were on August 31 and September 3.

MARYLAND YELLOW-THROAT (6 = 3 pairs).—Very much in evidence every day but only in song during the first eleven days. On three of these days, July 25, 29 and 30, the song was *very abundant*. Then silence came abruptly as in the case of the Catbirds. From July 31 on, with the exception of August 6 and 7 when they were heard *occasionally*, the birds' vocal expression was limited to sharp chips.

CARDINAL (2 = 1 pair).—On the first four days, the male was in full song, singing *very abundantly*. From then on to August 10, the song was abruptly reduced, being limited to *occasional* snatches. During the remaining twenty-six days, only calls were heard with two notable exceptions, on August 19 and 23, when the male again sang *very abundantly* and as loudly as he did in the first few days. The female was never very far from the male, but was never heard to sing.

INDIGO BUNTING ($24 \pm$).—Easily the most voluble and reliable of our singers. We heard it sing on 41 out of the 47 days and the days when it did not sing were almost all during the cold wave. The song was *very abundant* up to August 3; from this date to August 20 the average was *moderate*. After the cold wave, the song was resumed but on a much reduced scale. On our last day (September 4) one bird was singing *abundantly*, but it was only one out of over two dozen.

It is sometimes tiresome to hear this bird sing because it can go on for hours without stopping, while the song grows harsher and harsher and begins to slur and break. The singing perch is invariably the topmost exposed branch of the tallest near-by tree, and birds that apparently have no trees on their territories will hold forth from the electric wires.

GOLDFINCH (40±).—It was hard to estimate the numbers of this cheerful little bird, as small flocks of a half dozen or more were constantly in evidence. They were never silent, and their sweet flight babble came at all hours of the day. They were about as gregarious, vocal and playful at the end of the summer as at the beginning. On two mornings, the full love song was heard, given with great abandon. On both occasions the bird was singing in a hemlock. This song is very canary-like, though perhaps purer than the song of the canary, as it lacks much of the trills of the domestic bird.

RED-EYED TOWHEE (2 = 1 pair).—Up to July 30, the male sang *very abundantly* on four days and *abundantly* on the others. As in the case of the Catbird and Yellow-throat, the song was then abruptly reduced, but not completely stopped, for on six of the next eight days to August 7, the bird sang *occasionally*. From then on it did not sing, but merely called. The species was seen every day.

GRASSHOPPER SPARROW (2 +).—We could be sure of only two birds, as they were so unobtrusive, though there were certainly more of them. These two were visitors to a grassy, weedy patch directly under our windows. We heard them singing only *occasionally* on July 29 and 31, and then, when we had almost forgotten them, they again sang, this time *abundantly*, on August 20 and 24, both days during the cold wave.

CHIPPING SPARROW (8).—Our Chippies sang steadily on a *moderate* average to August 12. After this date, though seen every day, they were completely silent except when one bird sang *occasionally* on August 20. A bird not resident in our territory was quite an individualist. His nest was in an arbor vitae bush a few feet from a small neon beer sign by the highway, and after nightfall he would mount on this blazing perch and sing on continuously.

FIELD SPARROW (10 ±).—This bird was a *very abundant* singer to August 10. As in the case of other species in our study, when the change came on this date it was abrupt, for during the remaining 13 days to August 23, the bird sang only *occasionally* on ten days. After the 23rd it was completely silent. In volubility, the Field Sparrows approached the Indigo Buntings though their song was never vociferous but always very pleasing.

SONG SPARROW (24 ±).—Our birds sang almost every day but only *moderately*. On only seven days they sang *abundantly*. There were a few silent days, mostly during the cold wave. As the cold wave persisted so near to the end of our study, it is difficult to say whether the song would have been resumed later to the same extent as before. The birds did sing after the cold days, but the records are insufficient to draw any conclusions from them. The earliest songs recorded were

at about 5:30 A. M., both in July and August. The bird is an early singer, taking third place in our study, after the Mourning Dove and Robin.

DISCUSSION

In three of the species included in this study, the records are inconclusive since the observations were insufficient; these are the Blue Jay, Black and White Warbler and Grasshopper Sparrow. When we began this study on July 20, in four of the species the individuals under observation apparently had already terminated their period of song or had passed their peak; these are the Phoebe, Tufted Titmouse, House Wren and Red-eyed Vireo. I am aware that in the case of the Phoebe and Red-eyed Vireo this information is contrary to usual expectations. This may be due to an insufficient number of birds under observation. The Goldfinch might also be included among the silent species as its true song was heard twice only, but, on the other hand, the flight song was kept up *abundantly* during the whole period.

After eliminating the above eight species, the thirteen remaining ones fall into four groups:

- A. Silent at first but beginning to resume song in late summer: Crested Flycatcher—August 17 on, a *moderate* singer.
- B. Song terminating abruptly or almost so: Catbird—*very abundant* to July 31; Maryland Yellow-throat—*very abundant* to July 30; Chipping Sparrow—*moderate* to August 12.
- C. Song reaching a peak, then decreasing markedly: Robin—*very abundant* to July 20, tapering off to August 14; Cardinal—*very abundant* to July 25, tapering off to August 9; Red-eyed Towhee—*very abundant* to July 30, tapering off to August 7; Field Sparrow—*very abundant* to August 10, tapering off to August 23.
- D. Song kept up all summer (to September 4): Mourning Dove—*moderate*; Wood Pewee—*moderate*; Crow—*moderate*; Indigo Bunting—*very abundant* to August 3, subsequently *moderate*; Song Sparrow—*moderate*.

It is interesting to note that all the birds that sang throughout the summer are not *very abundant* singers, with an individual exception in the case of the Mourning Dove and, of course, the Indigo Buntings during the first third of the study.

The first day of the cold wave was August 19. The birds in group B and C had already stopped singing long before this date (five out of seven by July 31, the other two on August 10 and 12) so that the termination of song had not been influenced by the weather which, up to the cold period, as I have already mentioned, had been extremely

even. In the birds of group D, all but the Crows were affected by the sudden and unusual cold, having their song very much reduced or eliminated.

SUMMARY

(1) During the middle and late summer of 1944 in Berks County, Pennsylvania, daily records were kept of the amount of song of 21 species of birds. The period covered 47 consecutive days, from July 20 to September 4.

(2) All but one species (Mourning Dove) were passerines, and of the latter, nine families were represented, of which the Fringillidae were the most numerous, with eight species.

(3) The method used is described, and an explanation given of the terms employed in measuring the amount of song.

(4) Records were kept of only the early morning song from dawn to 8:00 A. M. Descriptions of the limited area covered and the state of the weather are given.

(5) The results are correlated in the discussion.

COMMENTS BY MR. ARETAS B. SAUNDERS.

Mourning Dove. Non-passerine birds that sing seem to be more erratic about it than passerine species. Some years I hear a great abundance of Mourning Dove song, most of the summer. In other years they cease early. The same is true of the Cuckoos.

I doubt if the calls of Jays and Crows are properly song. They seem to be not at all seasonal, but used all the year around. They finish nesting early and wander about in late summer, which would account for the erratic records.

The House Wren male sings while feeding young. According to observations of the late Miss Althea Sherman, the song is the stimulus which causes the young, before their eyes are opened, to open their mouths for food. Probably the young of the pairs that did not sing were too old.

It is my observation that Catbirds do not sing while incubating or feeding young, but sing abundantly between the end of nesting and the beginning of molt, which comes about August 1, but why they cease abruptly while Robins taper off I do not understand.

Your observations on Red-eyed Vireos are unusual. I generally find them singing abundantly every day till the second or third week of August. Then there is less song for a week or so, but rarely complete cessation, and an increase of song toward the end of August and a continuance for a few days in September.

The Black and White Warbler ceases nesting and regular singing with the molt in early July. Then it gradually revives singing in late July and August, but never so abundantly as in the nesting season. Your observations evidently began too late to note anything but the revived singing.

American Museum of Natural History
New York, N. Y.

A PEDUNCULATE, DOUBLE-YOLKED HEN'S EGG
CONTAINING AN INTRAFOLLICULAR OVUM

BY F. B. HUTT

Plate 7

DOUBLE-YOLKED eggs are familiar objects, but, so far as the writer can determine, the voluminous literature on abnormal eggs contains only two records of specimens like the one illustrated in Plate 7 (upper figure).

Description. The egg was left at this department without any record of its history, and by the time it was brought to the writer's attention, the donor could not be traced. The egg weighed 71.6 grams, which is almost 20 per cent less than the 86.26 grams given by Pearl (1910) as the average weight of 18 double-yolked eggs in his collection. It resembled other double-yolked eggs in shape, but differed in being apparently truncated at the large end and showing there a dark peduncle, not unlike the stem of a pear, which protruded through the shell membranes. The latter were covered with a thin encrustation of shell. There was no air cell and no shell at the larger end other than this slight deposit on the membranes. The latter were sunken so that, when the egg was held vertically with large end upward, the surface of the membranes was slightly concave.

At first glance, it seemed as if the shell at the large end had been removed, leaving only the inner shell membrane, which would have formed the base of the air cell in any normal egg. Closer examination showed that it was more likely that the large end had never had any covering of shell other than the very thin layer over the membranes. This seemed probable because (1) the normal thick shell flared slightly outward where it terminated at the periphery of the membranous area, and (2) on dissection of that part, both inner and outer shell membranes were found. If the egg had ever been completely covered and some shell then removed from the large end, the outer shell membrane would have been lost with it.

When a window was cut in the shell, the nature of the abnormality was evident. In addition to a normal yolk, the egg contained another that was still enclosed in its follicle (Plate 7). It was the twisted stalk of the latter that protruded through the membranes. The larger blood vessels in the follicle were quite distinct, as was the stigma, the crescentic area free of blood vessels which normally ruptures to release the ovum from the ovary. The abnormal follicle with stalk and contents weighed only 7.4 grams. It was spherical in shape, with diameters varying from 23 to 25 mm. These figures indicate that it was

only about half the size of a mature follicle in the ovary of a hen that would lay a standard-sized egg of 57 grams. However, since the normal yolk of the two in the egg weighed only 9.56 grams, it cannot be assumed that the one in the follicle was far from maturity. The stalk was 11 mm. long.

The intrafollicular ovum and the other yolk were encapsulated by a layer of thick albumen common to both. This is evidence that they had passed together through the albumen-secreting portion of the oviduct. It will be noted in the illustration that the intrafollicular ovum lay in the larger end of the shell. Since most eggs are formed with the small end caudad, this indicates that the normal yolk preceded the other one down the oviduct. It follows therefore, that the infundibulum probably engulfed the normal one first and the follicle second.

Origin. It is not known why a follicle should thus become separated from the ovary. Warren and Scott (1935), who observed the ovulation of twelve ova, concluded that the process was not caused by any pressure of the infundibulum. It seems even less likely that the infundibulum should pull an entire follicle from the ovary, and one might expect, therefore, to find the cause of the abnormal occurrence in the follicle itself. In this case, a dark purple area, 17 mm. in diameter, near the stigma was found to result from extravasated blood, which was spread thinly between the yolk and the follicle. This may have been either the cause or the effect of the separation, but the former interpretation seems more probable because the blood was remote from the stalk. In the very unusual specimen described by Parker and Kempster (1940), a large blood clot found in an egg was attached to a fragment of the ovary containing about 25 immature ova. In that case, however, it seemed possible that detachment of the fragment resulted from traction as the blood clot was forced down the oviduct.

In another intrafollicular ovum laid by a fowl (Hutt, 1939), no such clot was present. In that follicle, the blood vessels were congested with blood and the general appearance was healthy like that of mature follicles still attached to the ovary. Its stalk was thin, lacking in blood, and tapered almost to a thread. In the present case, the follicle was dark in color and appeared to have been dead for some time. The twisted stalk was thinnest near the follicle and thickest at its extremity.

Other Similar Eggs. A double-yolked egg similar to this one was described by Laboulbène (1859) and illustrated by Davaine (1860). It differed chiefly in that each enclosure seemed to have its own

envelopes of albumen and the intrafollicular ovum was loosely covered with a "false membrane" lacking blood vessels. As in the present specimen, the peduncle projected through the shell membranes at the large end, which was truncated, and these membranes lacked shell. In both cases no shell was deposited on the extruding stalk of the follicle. It is not clear why the shell membranes at the large end should fail to receive a normal deposit of shell, but, since both eggs were alike in this respect, even though separated in time by 86 years, it seems probable that the stalk projecting from them interfered in some way with the normal process of shell deposition.

Davaine (*op. cit.*) reproduced an illustration used by André Cleyer in 1682 to support his account of an egg laid in 1664 and given to the magistrate of Nuremberg. It contained a normal yolk and a body "like the fruit of the arbutus tree" from which a stalk protruded through the large end of the egg. Professor W. C. Muenscher informs the writer that this fruit is characterized by a rather rough coat. Since a shrunk follicle in an egg none too fresh could also have a somewhat rough surface, Cleyer's description seems quite fitting. His illustration, taken from Davaine, is shown in Plate 7 (lower figure). It suggests that the shell was lacking on the large end.

Although Davaine was commendably reluctant to give too much credence to this report because "we know that in Cleyer's time the figures attached to observations were generally no more than approximate likenesses, or even only schematic representations, that is to say such as the imagination conceived the objects represented," the resemblance of Cleyer's egg to the writer's and to that of Laboulbène is so great as to suggest that, if modern techniques had been available in 1682, Cleyer's illustration would have been little different from the other in Plate 7.

SUMMARY

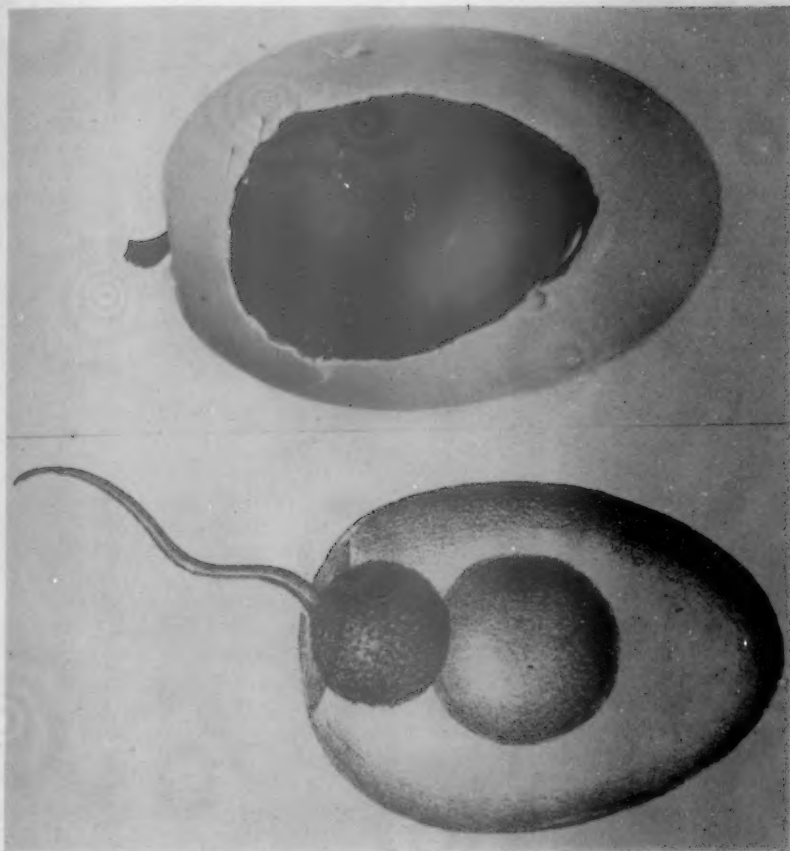
An egg is described and illustrated that contained one normal yolk and another still enclosed in an ovarian follicle. The stalk of this protruded through the shell membranes at the large end of the egg. This end was truncated and the membranes there had only a very thin covering of shell.

Two similar cases are cited from the literature and Cleyer's figure of such an egg, drawn in 1682, is reproduced from Davaine's memoir.

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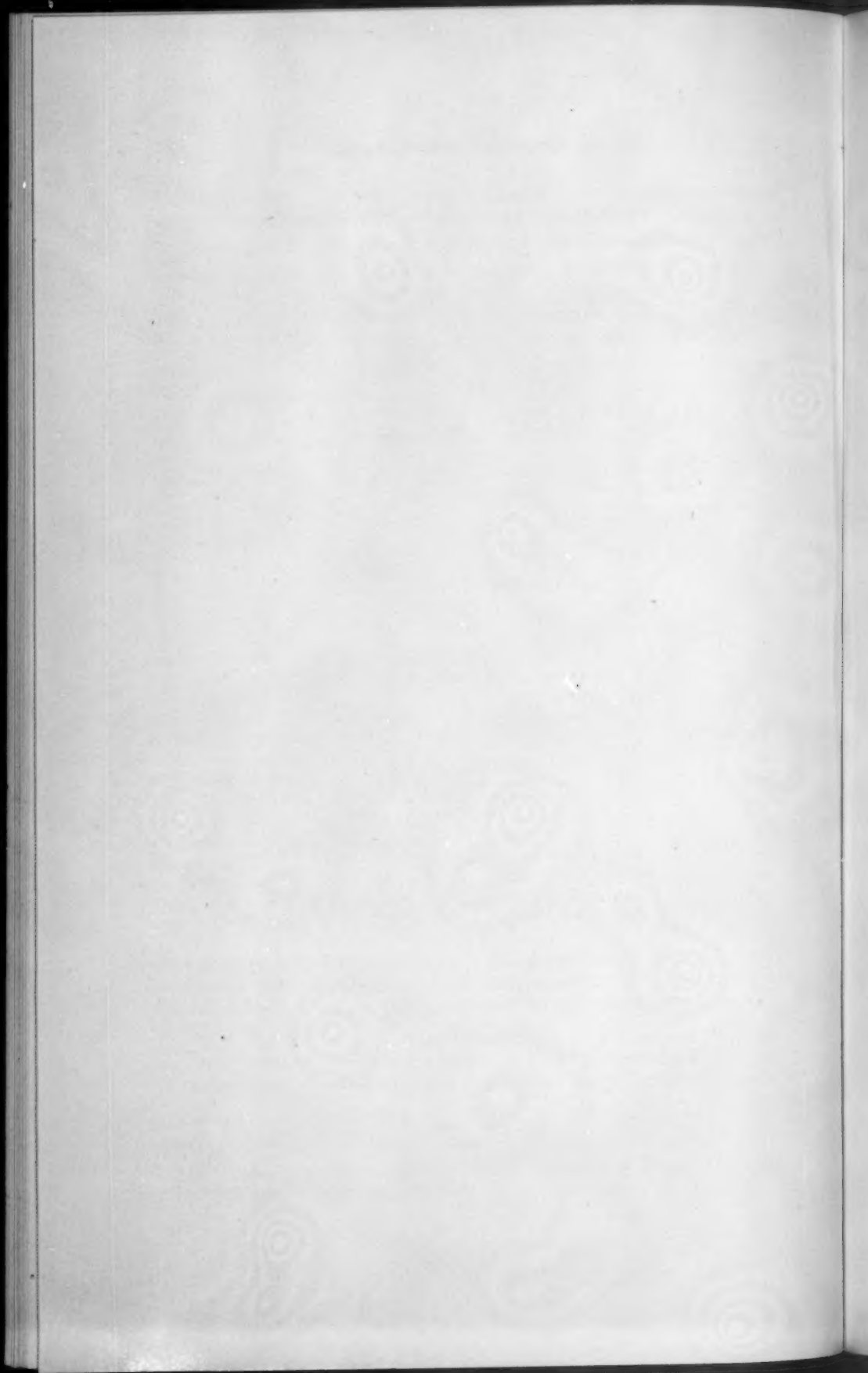
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A PEDUNCULATE, DOUBLE-YOLKED HEN'S EGG.

(Upper figure), THE EGG DESCRIBED IN THE CONTEXT.

(Lower figure), CLEVER'S ILLUSTRATION OF A SIMILAR EGG DESCRIBED IN 1682
(FROM DAVAINÉ).



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EVIDENCE OF TRANS-GULF MIGRATION

BY GEORGE H. LOWERY, JR.

PREFATORY NOTE.—It was my privilege to review in manuscript the present paper by Mr. Lowery which, with his paper in the *Wilson Bulletin* for June, 1945, I commend to all students of bird migration.

The phenomenon that we know as the migration of birds is a highly complex subject involving much more than the recording of the dates of arrival and departure of the winged travelers. Although much remains to be learned, there are certain ideas about migration that, on the basis of available information, have been accepted as facts for many years. Among these is the concept of trans-Gulf migration. Admittedly, data have not been extensive, but logical deductions from their study have fully justified this interpretation. Possibly acceptance has been due in part to the fact that on a world-wide basis, over-water travel by birds of equal or greater distances is not unusual. Because of this, many students of the migration of North American birds have been startled by the recent challenge to what they have rightly considered an accepted feature of the movement as applied to the Western Hemisphere.

Accepting the challenge, Mr. Lowery has not only obtained important new material in support of the original concept, but by an inspired analytical discussion of all features, particularly the climatological situation, has firmly re-established the belief that many, perhaps most, of the North American migrants that spend the winter season in South and Central America reach their destinations in spring and fall by direct flight across the Gulf of Mexico.—FREDERICK C. LINCOLN, *Biologist in Charge, Distribution and Migration of Birds, U. S. Fish and Wildlife Service.*

FOR many years all ornithologists agreed that vast numbers and many kinds of land birds migrate straight across the Gulf of Mexico each spring and fall. Recently, the existence of this trans-Gulf flyway was denied on theoretical grounds (Williams, 1945). Consequently,

further direct field investigation of the subject became desirable. The present paper is concerned chiefly with the preliminary results of such a study. It will adduce definite records in number proving that the presence of land birds over the Gulf is commonplace. It will show how these observations, supported by direct evidence of another sort, demonstrate a trans-Gulf flyway of major proportions. And, finally, it will point out fallacies in the arguments against trans-Gulf migration.

But first, in order that the issues may be clearly understood, we must briefly review the development of ideas concerning Gulf migration in general.

1. CONCEPTS OF GULF MIGRATION

The long-accepted opinion has been that the many species of North American birds wintering south of the United States migrate between their summer and winter homes along several routes. Wells W. Cooke, as early as 1904 and 1905, recognized that small land birds leave, and return to, the United States by four avenues of flight associated with the present problem: (1) Florida to Cuba; (2) Western Florida to Yucatán; (3) northern coast of the Gulf of Mexico southward; and (4) Texas to México by land. He felt certain that the overwhelming majority of birds use the second and third routes, which are trans-Gulf in character. In a summary of 66 species (1905: 9), he classed 49 as predominantly trans-Gulf migrants. On the other hand, he believed that 30 species of warblers alone were at least represented on the other two routes. Thus, he viewed migration across the Gulf and migration along its eastern and western edges not as conflicting concepts but as complementary parts of a broad semi-annual movement. The idea of migration around the Gulf is as old as the idea of trans-Gulf migration itself.

In the formal presentation of his theories, Cooke cited no direct evidence, although his writings elsewhere include obscure mention of an account (Frazar, 1881: 250-252) describing 23 species of land birds seen on the open Gulf. He based his case wholly on the vast amount of distributional data at his disposal in the files of the Biological Survey, which included information from eastern México and other critical areas that has never been published. These records revealed that many species passing annually from the Gulf States to South and Central America were all but unknown in eastern México and southern Florida. These abrupt gaps in distribution convinced Cooke that such species were trans-Gulf migrants. Another apparently significant feature of the data was the odd sequence of arrival dates along the Texas coast for certain birds. In spring these dates were not

progressively later from south to north, as one would expect, but from *north to south*. For example, the average arrival of the Black and White Warbler in northeastern Texas was eight days earlier than its arrival at Corpus Christi, 300 miles to the south. Cooke suggested (1905: 2): "A probable explanation of such sets of records is that these early birds in northeastern Texas have reached the northeastern coast of Texas by a flight across the Gulf of Mexico, and this long journey performed in a single night has carried them north earlier than their fellows which reach southern Texas by a slow land journey from Mexico."

Since Cooke's day, a wealth of data on migration through the central Gulf Coast region has been assembled. Much of this is only now coming into print. Weston has spent 29 years studying the bird life of northwestern Florida, and his observations have been recorded in part in his periodic reports in 'Bird-Lore' and 'Audubon Magazine' (1924-1945) and in Howell's 'Florida Bird Life' (1932). Thomas D. Burleigh devoted eight years to an intensive field study of the bird life in the Gulf Coast region of southern Mississippi, and his observations have recently been published (1944). Of special interest in connection with Burleigh's work is the fact that during the eight years of his residence at Gulfport he lived in a heavily wooded area within 100 yards of the Gulf shore and was able therefore to make daily observations of the arrival and departure of migrating birds. My own studies began in 1929 when I returned to Louisiana after several year's residence on the coast of northwestern Florida. During the latter of these 17 years I had the assistance of a number of highly capable students and ornithologists, including James Henry Bruns, Thomas D. Burleigh, Thomas R. Howell, Robert J. Newman, Sam M. Ray, Robert E. Tucker, H. E. Wallace, and the late Austin W. Burdick. A considerable part of our work has been devoted to observations along various sections of the northern Gulf Coast, principally that of Louisiana.

None of these studies, from northwestern Florida to southwestern Louisiana, has revealed facts inconsistent with Cooke's basic concepts. However, as more and more field work was done, certain unexplained phenomena became increasingly apparent. During fine weather in spring almost no transient migrants could be found in the region, but during periods of storm tremendous precipitations of such migrants were encountered. Workers along the central Gulf Coast, where the shore lies at right angles to the trans-Gulf line of flight, knew from the testimony of their own eyes during times of visible migration that birds usually came in from the sea and that consequently any explana-

tion of the anomalies would probably be found in some consideration growing naturally out of the trans-Gulf theory.

The influence of weather conditions on the presence or absence of migrants on the northern Gulf Coast appeared so important that I undertook to correlate the occurrence of transients with factual meteorological data. I have discussed in detail the results of this study in a recent publication (1945: 92-121), but a brief résumé here is important to the thesis of this paper. In this region, the weather often changes suddenly as cold air masses move down from the north and come in contact with warm Gulf air masses. Prior to the arrival of these cold fronts, the surface winds are usually from the south and southeast and the air is humid. When a cold front reaches the coast and begins to underrun the warm Gulf air masses at that point, the wind direction changes abruptly to the north and the temperature drops rapidly. The actual contact of the cold, dry air masses with the warm, moist air is usually attended by thunderstorm activity. As the warm air ascends, it expands and condensation results. The junction of the two air masses forms what is known as the 'squall line,' in which the winds are intermittent and variable, and there is lightning, rain, and sometimes hail. Birds within the storm area are precipitated. However, as the squall line passes southward beyond the coast, northerly winds prevail across the whole Gulf Coast region now covered by the cold, dry air. It is then, and only then, that the Gulf Coast is deluged with thousands upon thousands of migrant land birds, which pile up in such immense pyramiding concentrations that every bush and tree in some areas is sometimes crowded with birds. I have already described this phenomenon in detail (*loc. cit.*), but I want to reiterate at this time that tremendous precipitations of migrants occur only when the wind shifts into the north. They do not occur in appreciable numbers when the winds are from the east and southeast prior to the arrival of the cold fronts. Obviously, the strong northerly winds represent a barrier to a *south-north* line of flight. Results of these studies point inescapably to the conclusion that birds noted under such conditions are trans-Gulf migrants that are arriving continuously across a broad front; for, regardless at what hour of the day a cold front reaches the coast and passes southward over the Gulf, migrants are invariably precipitated in great numbers. Thus, when confronted with a strong wind barrier before reaching shore, the birds suffer increased fatigue and therefore come down on the first available land. However, during fine weather they do not stop on the coastal islands and ridges, but instead pass inland some distance before alighting. In other words, under those conditions a considerable part of the central coastal plain is almost devoid of transient bird life.

As a result of these and other observations, a comprehensive modern theory of Gulf migration must both extend and modify the details of the original concept. Cooke realized that a few species of flycatchers, vireos, and warblers normally pass over the Gulf States and the Gulf of Mexico in one flight. But he failed to grasp the fact that virtually all the other species of transients, *i. e.*, migrants that do not breed in the region, behave in the same way unless confronted by a weather barrier. We now know that the principle of the coastal hiatus must be included as an integral part of the trans-Gulf theory. We know also that the arrival of trans-Gulf migrants on the northern Gulf Coast must be a more or less continuous process and that therefore Cooke's notion that the flight is accomplished overnight is a non-essential detail. Moreover, while Cooke had little to say about the migration of diurnal birds, the use of a coastwise route by such species has since been recognized by Gulf Coast ornithologists. Diurnal migrants that are well known to be in part coastwise include ducks, geese, herons, hawks, certain shorebirds, and the Cliff Swallow.

Meanwhile there had been a reawakening of ornithological interest on and near the eastern coast of Texas. In 1936, L. Irby Davis began the publication of a series of bimonthly reports on the birds of the Rio Grande Delta Region, which were supplanted in 1941 by George G. Williams's summaries covering the middle and northern Texas coasts and their environs. These reports, particularly the latter, have repeatedly revealed phenomena strikingly similar to those on the central Gulf Coast, *viz.*, the absence of transients in fair weather, the abundance of transients on the coast in cold-front weather, and the scarcity of transients inland under any circumstances. In Louisiana and Mississippi, such conditions can be adequately accounted for only by the principle of the coastal hiatus; but in Texas, another explanation seemed acceptable. It occurred to Williams that, perhaps, trans-Gulf migration was a myth, that all Gulf migration was confined to a narrow coastal pathway along which vast flights of birds passed day and night, too high to be seen unless forced down by bad weather. While my alternative explanation and Burleigh's 'The Bird Life of the Gulf Coast Region of Southern Mississippi' (1944) were still in press, Williams came forward with a formal presentation of his theory (1945: 98-111).

Williams built a persuasive case. He felt that recent field work on the Texas coast had invalidated most of the indirect evidence adduced by Cooke. And he pointed out that in 63 years there had been only two published accounts of birds seen from ships plying the open Gulf in spring (Frazer, 1881; Helmuth, 1920). He believed that there were

serious flaws in these records as evidence of trans-Gulf migration. They had been secured in stormy weather; they were not in the middle of the Gulf; and they included species not generally known to winter south of the Gulf. He said: "It seems, therefore, that if birds really did migrate across the Gulf itself, they would have appeared at some time on ships plying across the middle of the Gulf. But I can find no record of such appearances. All seeming records . . . when broken down and analyzed critically, reveal only the well-known fact that adverse winds may blow migrating birds to sea." Finally, in conclusion, he added: "There is no direct evidence to show that birds migrating from regions south of us in spring actually cross the Gulf of Mexico; but there is abundant evidence to show that these birds, both individuals and species, take the coastwise routes *around* the eastern and western edges of the Gulf."

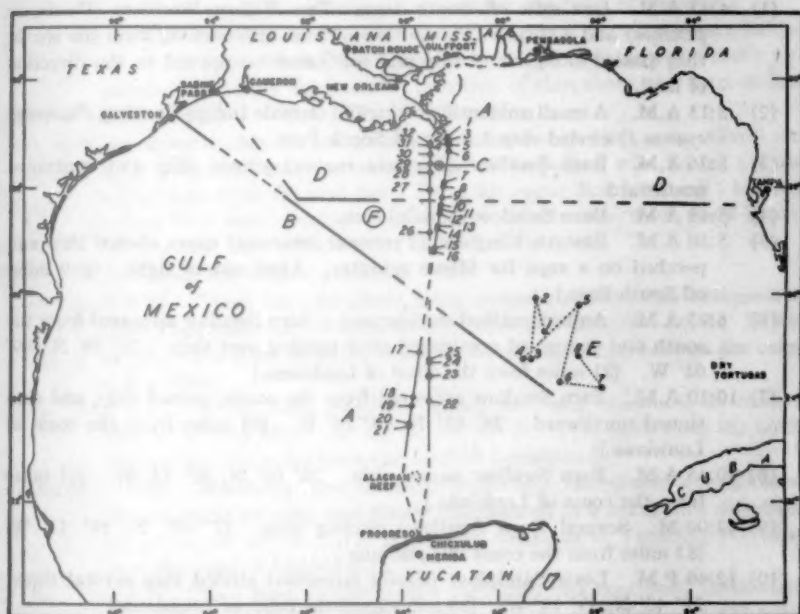
An analysis of Williams's arguments is given at the conclusion of this article. However, one inconsistency must be pointed out now. He agrees (*op. cit.*: 107-108) with all Gulf-Coast observers that migrants are rare or absent on the northern Gulf Coast in fair weather. He supposes that under such conditions birds are passing overhead continuously during the migrating season even though they are invisible. But, if the apparent absence of migrants along the Texas coast in fair weather does not imply their absence high over land, neither would a similar lack of birds at visible levels out on the Gulf prove their absence high over water. Even though an ornithologist were to cross the Gulf several times and see no birds, Williams still could not claim that such negative evidence was significant without exposing a similar weakness in his own theory.

However, Williams probably succeeded in establishing a reasonable doubt of trans-Gulf migration in the minds of some readers. For this reason I made plans to test the truth of the theory in the only place it could be tested—on the open Gulf, under sunny skies, along the 500-mile seaway from the mouth of the Mississippi River to Yucatán. This plan had been in prospect for a number of years, but because of circumstances it had been relegated to the postwar agenda. Fortunately, however, I was able to secure passage on a freighter bound for Progreso, Yucatán. The account of this trip will furnish indisputable evidence in support of trans-Gulf migration.

II. OBSERVATIONS OVER THE GULF OF MEXICO

A. ROUND TRIP VOYAGE BETWEEN LOUISIANA AND YUCATÁN ON THE
S. S. 'BERTHA BRØVIG'

I sailed from New Orleans at 9:30 P. M. on April 29, 1945, on a slow freighter, the S. S. 'Bertha Brøvig,' bound for Progreso, Yucatán. It had been my intention to record the number and approximate direction of flight of any birds seen crossing the moon while the ship was at sea. This, however, proved impracticable because of the slight roll and vibration of the ship. I was unable, at least on this occasion, to keep the telescope focused on the moon. (See Section III C beyond.) Consequently, observations at sea were confined to birds that either



TEXT-FIGURE 1.—Map showing the location of the principal observations discussed in this paper. (A) The round trip voyage on the S. S. 'Bertha Brøvig' en route between Louisiana and Yucatán, April 30–May 11, 1945. Numbers refer to the observations in the text. Broken line represents travel at night when no observations were made. (B) The route traversed by Lieutenant J. C. Howell in crossing the Gulf on May 3–6, 1945. Broken line represents approximate travel at night based on the known speed of the ship. (C) The approximate position of M. A. Frazar when his observations were made on April 2, 1881. (D) The approximate route traveled by W. T. Helmuth between Sabine Pass and a point in the Gulf and then to Tampa, Florida, March 29–April 1, 1918. Solid lines here represent his probable positions when he observed his birds. (E) Positions of the U. S. Coast Guard Cutter 'Blanco' when observations were made in August, 1945. (F) Approximate position of S. S. 'West Quechee' on August 25, 1926, when ship passed through the center of a tropical hurricane. All positions were plotted on U. S. C. and G. S. Sailing Chart 1007 from which a tracing was made and reduced to this size.

passed the ship close enough for recognition or happened to come aboard.

Herewith is an exact transcription of my notes on the land birds seen and the precise position in the Gulf where each was recorded. The approximate number of statute miles from the nearest land is placed in brackets following each observation. Numbers preceding each observation are the reference points in Text-figure 1. The latitude and longitude of each observation were plotted on U. S. Coast and Geodetic Survey Sailing Chart No. 1007, and from this a tracing was made. Central Standard Time is employed throughout.

VOYAGE TO YUCATÁN

April 30, 1945. Clear; moderate ENE wind, shifting to E in afternoon.

- (1) 4:45 A.M. One mile off South Pass. Two Yellow Warblers (*Dendroica petechia*) and a thrush (*Hylocichla* sp.) seen approaching from the south; they passed alongside of ship and continued northward in the direction of land.
- (2) 5:15 A.M. A small unidentified fringillid (female Indigo Bunting, *Passerina cyanea* ?) circled ship 3 miles off South Pass.
- (3) 5:36 A.M. Barn Swallow (*Hirundo rustica*) passed ship and continued northward.
- (4) 5:48 A.M. Barn Swallow (female) seen.
- (5) 5:50 A.M. Eastern Kingbird (*Tyrannus tyrannus*) came aboard ship and perched on a rope for fifteen minutes. Land out of sight. [8-9 miles off South Pass.]
- (6) 6:45 A.M. An unidentified warbler and a Barn Swallow appeared from the south and continued northward after passing over ship. 28° 40' N., 89° 05' W. [21 miles from the coast of Louisiana.]
- (7) 10:10 A.M. Barn Swallow appeared from the south, passed ship, and continued northward. 28° 05' N, 89° 14' W. [61 miles from the coast of Louisiana.]
- (8) 10:45 A.M. Barn Swallow passed ship. 28° 00' N, 89° 15' W. [67 miles from the coast of Louisiana.]
- (9) 12:00 M. Several Barn Swallows circling ship. 27° 48' N, 89° 17' W. [82 miles from the coast of Louisiana.]
- (10) 12:40 P.M. Least Sandpiper (*Erolia minutilla*) circled ship several times. 27° 40' N, 89° 18' W. [90 miles from the coast of Louisiana.]
- (11) 12:55 P.M. Female Dickcissel (*Spiza americana*) and immature male Orchard Oriole (*Icterus spurius*) on deck feeding around hay strewed on top of hatch cover. 27° 36' N, 89° 18' W. [94 miles from the coast of Louisiana.] The ship's cargo included four jackasses in crates on the open deck. Several bales of hay were spread in front of these crates, and it is here that the Dickcissel and oriole spent their time. When approached, they flew to another part of the ship only to return to the hay immediately when no one was near. [Both birds were on board at 6:00 o'clock the following morning but could not be found when I returned to the deck after breakfast. The position of the ship at 6:00 A.M. on May 1 was 24° 54' N, 89° 40' W. Consequently these two birds rode the ship 189 miles in the wrong direction.]

- (12) 1:30 P.M. Two female Barn Swallows perched on rope alongside ship. Departed after a brief rest. 27° 30' N, 89° 19' W. [101 miles from the coast of Louisiana.]
- (13) 4:00 P.M. With difficulty I succeeded in capturing two female Barn Swallows (*Hirundo rustica erythrogaster*) by slipping up behind them as they perched half asleep on a rail. [The skins are now deposited in the L. S. U. M. Z.] Few minutes later four more Barn Swallows appeared on the ship; all seemed tired. 27° 15' N, 89° 20' W. [119 miles from the coast of Louisiana; 408 miles from the coast of Yucatán.]
- (14) 4:10 P.M. Adult male Black-poll Warbler (*Dendroica striata*) found with the Dickcissel and Orchard Oriole at the pile of hay. Rather tame but I was unable to catch it. [Position of ship not materially advanced over last observation.]
- (15) 5:55 P.M. Six Barn Swallows aboard. 26° 50' N, 89° 22' W. [149 miles from the coast of Louisiana; 378 miles from the coast of Yucatán.]
- (16) 6:00 P.M. Sixteen Barn Swallows aboard, all preparing to roost on a ladder suspended from the roof of a companionway; all very tame and easily approached to within a few feet. [Position of ship about the same as last observation.]

———— [Sometime during the middle of the afternoon two birds came aboard the ship's poop deck and were seen by one of the sailors, who did not tell me about them until the next day. From his vague description all I can say is that they were possibly some kind of rail, shore bird, or small heron. He said that they remained for only a few minutes.]

May 1, 1945. Clear, few clouds; gentle SE wind.

- (17) 6:00 A.M. Three Barn Swallows flying around the ship; they disappeared after a few minutes. Dickcissel and oriole still aboard. 24° 54' N, 89° 40' W. [248 miles from the coast of Louisiana; 282 miles from the coast of Yucatán.]
- (18) 11:10 A.M. Three Barn Swallows passed ship and continued northward without circling ship. 24° 02' N, 89° 47' W. [190 miles from the coast of Yucatán; 335 miles from the coast of Louisiana.]
- (19) 12:15 P.M. Mourning Dove (*Zenaidura macroura*) circled ship several times; did not alight on ship, and finally disappeared in a northward direction. 23° 50' N, 89° 47' W. [177 miles from the coast of Yucatán; 349 miles from the coast of Louisiana.]
- (20) 2:10 P.M. Two Barn Swallows flew past ship and continued northward. 23° 30' N, 89° 52' W. [154 miles from the coast of Yucatán; 372 miles from the coast of Louisiana.]
- (21) 2:15 P.M. Five Barn Swallows flew past the ship and continued northward. Position about the same as last observation.

May 2, 1945. Clear; gentle easterly wind.

5:00 A.M. Anchored one mile off Progreso harbor, waiting for docking pilot to come aboard. Three Barn Swallows approached from the direction of land, passed ship, and disappeared northward out of sight. [Captain Syvertsen told me later that he has seen three swallows do the same thing; his birds may have been the same ones that I saw.]

RETURN VOYAGE TO MISSISSIPPI RIVER

May 10, 1945. Clear; gentle SE wind.

- (22) 11:30 A.M. Cape May Warbler (*Dendroica tigrina*), a male, circled ship several times, paused momentarily on a rail a few feet from me, and then flew around to the front of the ship where it was lost from sight. 23° 37' N, 89° 27' W. [176 miles from the coast of Yucatán; 342 miles from coast of Louisiana.]
- (23) 2:15 P.M. Bobolink (*Dolichonyx oryzivorus*), a male, came aboard for a few minutes and then disappeared. 24° 26' N, 89° 27' W. [210 miles from the coast of Yucatán; 328 miles from the coast of Louisiana.]
- (24) 4:00 P.M. Bank Swallow (*Riparia riparia*) flew close by the ship and continued northward without hesitation. 24° 42' N, 89° 27' W. [224 miles from the coast of Yucatán; 312 miles from the coast of Louisiana.]
- (25) 4:15 P.M. Baird's (?) Sandpiper (*Erolia bairdii*) circled ship five or six times and was last seen flying northward. Several times the bird passed within a few feet of me, so close I did not need my binoculars. Since, however, the bird failed to alight on deck where it could be studied in a perched position, I have appended a question mark to the identification. [Position of the ship only slightly north of last observation.]

May 11, 1945. Clear; gentle SE wind.

- (26) 5:15 A.M. Yellow-throat (*Geothlypis trichas*), a female feeding around the winches by the main forward hatch. 27° 09' N, 89° 27' W. [121 miles from the coast of Louisiana. This bird remained aboard until we reached the mouth of the Mississippi River, shortly after 4:00 P.M.]
- (27) 10:00 A.M. Black-throated Green Warbler (*Dendroica virens virens*), a male in company with the Yellow-throat. When first noticed it was amidst the mechanism of the winches and not easily visible. Hence, it may have been on board for some time. After much difficulty we managed to corner the bird in a companionway and capture it. [The skin is now in the L. S. U. M. Z.] 27° 56' N, 89° 27' W. [66 miles from the coast of Louisiana.]
- (28) 11:30 A.M. A female Baltimore Oriole (?) (*Icterus galbula*) circled over the ship several times and once or twice acted as if it were about to alight. This, however, it did not do and it disappeared before I could get a completely satisfactory view of its markings. The identification of this bird is highly questionable and would not be recorded except for the fact that it represents a passerine bird at sea over the Gulf. 28° 15' N, 89° 27' W. [43 miles from the coast of Louisiana.]
- (29) 12:50 P.M. Gray Kingbird (*Tyrannus dominicensis*) flew back and forth past the bridge where I was standing, several times within 30 feet of me. I obtained a perfect view of the bird from above and below. It had no white terminal tail band; the upper parts were distinctly gray; and the large bill was noted clearly. The bird circled the bow of the ship and over the main hatch in front of the bridge and once seemed about to perch on a rope only a short distance away from me. After circling again it finally headed directly northward. As the bird left the vicinity of the ship, I asked the man at the wheel, who was watching the bird also, to check its direction of flight with the ship's compass. Had it continued flying in the same direction it would have made a landfall near South Pass. I have no

doubt whatever regarding the correctness of this identification. 28° 25' N, 89° 27' W. [32 miles from the coast of Louisiana.]

- (30) 2:00 P.M. Great Blue Heron (*Ardea herodias*) passed ship from East to West. 28° 30' N, 89° 27' W. [19 miles from the coast of Louisiana.]
- (31) 2:45 P.M. Duck Hawk (*Falco peregrinus*) flew over ship and continued northward. [16 miles from the coast of Louisiana.]
- (32) 2:46 P.M. Redstart (*Setophaga ruticilla*), a male, appeared on ship and stayed until the ship was within a half mile of land. I observed it leave the ship and head for shore. [First noted when the ship was about 16 miles offshore, immediately after the Duck Hawk was seen.]

RÉSUMÉ OF THESE OBSERVATIONS.—The ship traveled exactly across the middle of the Gulf; I knew the precise position of the ship at all times and was able to record the latitude and longitude of each observation; the weather was clear with hardly a cloud in the sky at any time; the wind was gentle easterly and southeasterly throughout the voyage, except on the first morning when a moderate ENE wind prevailed; the trip was made (especially the return) after the peak of migration in this latitude, when only late migrants might be expected. Under these conditions 21 species of land birds were seen by me while the ship was at sea and at distances varying from one to 248 miles from the nearest land, the latter being almost equivalent to the middle of the Gulf. Of the 21 species of birds seen, 18 were observed under circumstances permitting positive identification. Ten came aboard the ship and 11 went past without stopping. Many did not even hesitate. At least 61 individuals were counted, 32 of which did not alight on the ship. All birds that were seen before they reached the ship approached from the south, with the exception of the Great Blue Heron, which passed across the bow of the boat from east to west. All of the birds seen leaving the ship, or passing it, flew as directly toward the mouth of the Mississippi River as if land had been in sight.

I wish to add that I do not believe that I saw all of the birds that came aboard or passed the ship during the voyage. The birds observed by the sailor on the poop deck on April 30 substantiate this belief. Moreover, in the course of walking back and forth the length of the ship, I frequently saw birds which I would have missed had I been, let us say, on the opposite end of the vessel. Also there were unavoidable intermissions in the observations.

The ship is of Norwegian registry and has an entirely Norwegian or Norwegian-American crew. The officers of the ship, and many of the crew, are well-educated men who demonstrated a sincere intellectual interest in the problem. In the course of the voyage I had ample opportunity to converse with many of the men aboard regarding other times when birds may have been noted on the ship while in the Gulf of

Mexico. This boat had been in service between New Orleans and Progreso for seven years with little change in crew, especially among the officers. Some of the men told me in no uncertain terms that seeing small land birds on deck was commonplace. Furthermore, they told me of occasions when "small birds were everywhere." I am inclined to believe that when they speak of seeing "many" birds this means a considerable number. Even though 16 Barn Swallows and several other birds were on deck at dusk on April 30, this number impressed none of the men as being "many" birds. Moreover, by far the majority of the birds I observed went entirely unnoticed by members of the crew near me at the time.

B. OBSERVATIONS BY JOSEPH C. HOWELL WHILE CROSSING THE GULF
FROM GALVESTON TO YUCATÁN CHANNEL

By fortunate coincidence, my friend Lieutenant Joseph C. Howell, the well known ornithologist, happened to cross the Gulf of Mexico by boat from Galveston, Texas, to the Yucatán Channel, on May 3-6, 1945. When Lieutenant Howell returned to the United States I conversed with him about his findings. He generously turned over all of his notes to me with permission to include them here. Howell's observations are of the utmost importance for two reasons. First, they were made near the middle of the Gulf¹ under different weather conditions from those I encountered on the Gulf. Secondly, his records for May 5 coincided in date with my astronomical observations of birds passing over Progreso in the direction of the coast of Louisiana and Mississippi, *i. e.*, beginning a trans-Gulf migration.

A transcription of Howell's notes follows:

Left Galveston at 14:32 o'clock [1:32 P.M., C. S. T.], May 3, 1945. Course 127° T. Speed 10 knots. The first migrant land birds were seen on May 4, 150 nautical miles SE of Galveston, Texas [*cf.* Text-figure 1]. Many of the species noted on May 4 were observed again on May 5, but some of those seen on the latter date could have been birds of the previous day that had stayed aboard during the night. A Bank Swallow and a male Indigo Bunting were the only species seen on May 5 and not on May 4.

Twenty-one species and a minimum of 65 individuals were seen during the two days. A Red-backed Sandpiper was the only bird observed that did not alight on the ship. A complete list of the species observed in the Gulf follows, with a conservative estimate of the number of individuals involved after due allowances are made for birds that possibly stayed aboard more than one day:

¹ Howell's distance from the nearest land (*vis.*, Louisiana) on May 4 varied from approximately 121 to 179 statute miles; on May 5, his distance from the nearest land (Yucatán) varied approximately from 271 to 169 miles.

Green Heron (<i>Butorides virescens</i>), 1	Yellow Warbler (<i>Dendroica petechia</i>), 5
Least Bittern (<i>Ixobrychus exilis</i>), 2	Magnolia Warbler (<i>Dendroica magnolia</i>), 1 ♂
Purple Gallinule (<i>Porphyryla martinica</i>), 15	Bay-breasted Warbler (<i>Dendroica castanea</i>), 1 ♀
Red-backed Sandpiper (<i>Erolia alpina</i>), 1	Louisiana Water-Thrush (<i>Seiurus motacilla</i>), 1
Yellow-billed Cuckoo (<i>Coccyzus americanus</i>), 8	Kentucky Warbler (<i>Oporornis formosus</i>), 1
Nighthawk (<i>Chordeiles</i> sp.), 3	Redstart (<i>Setophaga ruticilla</i>), 2 ♂
Acadian (?) Flycatcher (<i>Empidonax virescens</i>), 1	Tanager (<i>Piranga</i> sp.), 1 ♀
Bank Swallow (<i>Riparia riparia</i>), 1	Orchard Oriole (<i>Icterus spurius</i>), 2 ♂ ♀
Barn Swallow (<i>Hirundo rustica</i>), 12	Baltimore Oriole (<i>Icterus galbula</i>), 1 ♂
Catbird (<i>Dumetella carolinensis</i>), 2	Indigo Bunting (<i>Passerina cyanea</i>), 1 ♂
Veery (<i>Hylocichla fuscescens</i>), 2	

All of the birds seemed to be weak. In flight they were feeble and clumsy and many alighted close enough to be caught by hand. One gallinule alighted on the gun deck during an early morning drill and skidded right amongst the gun crew. Twelve gallinules were caught by hand, and although they were awake, they appeared too exhausted to try successfully to escape. A Yellow Warbler, Louisiana Water-Thrush, Barn Swallow, Redstart, Bay-breasted Warbler, and Least Bittern were also caught by hand. Most of the birds appeared to be very sleepy. I caught one of the gallinules while it slept in a gun tub. All had their heads tucked beneath their wings. I noted a Green Heron, Yellow-billed Cuckoo, and Barn Swallow sleeping while I was within ten feet of them, but only the gallinules had their heads beneath their wings.

During the daylight the swallows flew over the decks and near the ship. The gallinules, bitterns, and Catbirds spent most of their time more or less secreted in the winches or among the crates of the deck cargo. The other species alighted on wires, boxes, or even on the open deck. Not a bird was heard to give its song, and all were silent except when disturbed.

At night a cuckoo perched on a railing, and the gallinules hid in the machinery of the winches, or in the deck cargo. A Redstart occupied an empty gear locker and a Baltimore Oriole slept on a coil of rope on the open deck.

Most of the birds came aboard during the daylight hours of May 4. No time of the day was favored over any other. Some of the warblers definitely stayed more than 24 hours, and probably some of the cuckoos, gallinules, swallows, and bitterns did likewise. Most of the birds stayed at least 12 hours. Two different gallinules were seen to alight in the water alongside the ship after being frightened from the deck. One of these was seen to take off again and the other remained afloat until the ship was out of sight. Only a single Barn Swallow was definitely thought to have died aboard from natural causes.

C. OBSERVATIONS BY FRAZAR AND HELMUTH

My notes have shown the late spring status of birds at visible levels over the Gulf during fair weather when the winds favor northward flight. Howell's observations have shown what happens when the skies are clear and the winds moderate but adverse. What, then, is the situation when the full fury of storm sweeps southward over the water? No ornithologist in recent years has had an opportunity to

furnish an eye-witness answer. To find out we must go back to the reports of Helmuth (1920) and Frazar (1882). Although the significance of their accounts as proof of trans-Gulf migration has been questioned by Williams (*loc. cit.*), they form important parts of the data on birds over the Gulf and must be re-evaluated in the light of recent findings, as I shall do beyond. But to appreciate their true meaning, one must read more than brief excerpts. Since they were published long ago and may be unavailable to many readers today, the pertinent passages are reproduced here in full:

FRAZAR'S ACCOUNT

April 2, 1881, found me in a small schooner, on the passage from Brazos de Santiago, Texas, to Mobile, Alabama. At about noon of that day the wind suddenly changed from east to north, and within an hour it was blowing a gale; we were now about thirty miles south of the mouths of the Mississippi River, which would bring the vessel on a line with the river and the peninsular [*sic*] of Yucatán. Up to the time the storm commenced the only land birds seen were three Yellow-rumped Warblers (*Dendroeca coronata*) that came aboard the day previous, keeping us company the most of the day; but within an hour after the storm broke they began to appear, and in a very short time birds of various species were to be seen in all directions, singly and in small flocks, and all flying toward the Mississippi River. These birds of course must have been far overhead and only came down near the surface of the water in endeavoring to escape from the force of the wind. By four o'clock it had come to be a serious matter with them, as the gale was too strong for them to make scarcely any progress. As long as they were in the trough of the sea the wind had little effect on them, but as soon as they reached the crest of a wave it would catch them up and in an instant they were blown hundreds of yards back or else into the water and drowned.

A great many flew on to the deck of the vessel to be washed about by the next wave that came over the side. Although I made no attempt to count the number of specimens that came aboard, I should estimate them at considerably over a hundred and a great many more struck the sides and tumbled back into the water. It was sad indeed to see them struggling along by the side of the vessel in trying to pass ahead of her, for as soon as they were clear of the bow, they were invariably blown back into the water and drowned. Most of those that came aboard were washed into the sea again, but the next day we found about a dozen dead bodies that had lodged underneath the galley. The following is a list of the species recognized, and if more time could have been given to observation I undoubtedly could have made out others.

1. Wood Thrush. About twenty seen.
2. Black-and-white Creeper. Abundant.
3. Prothonotary Warbler. Large numbers.
4. Worm-eating Warbler. Large numbers.
5. Yellow-rumped Warbler. A few.
6. Chestnut-sided Warbler. Quite a number.
7. Yellow Warbler. Quite a number.
8. Golden-crowned Thrush. A few.
9. Kentucky Warbler. Large numbers.
10. Mourning Warbler. Large numbers.
11. Maryland Yellow-throat. Very abundant.
12. Hooded Warbler. Large numbers.
13. Redstart. The most abundant.
14. Cliff Swallow. Saw one.
15. Scarlet Tanager. Quite a number.
16. Summer Redbird. A few.
17. Towhee. A few.
18. Indigo Bird. As plentiful as Redstarts.
19. Nonpareil. Quite abundant.

20. Flycatchers. Saw a large number of the smaller species, but recognized only *Sayornis fuscus* (Phoebe). 21. Pigeon Hawk. Saw one. 22. Carolina Dove. A few. 23. Turnstone. Only one seen.

One important conclusion which can be drawn from these observations seems to be that instead of following the land a large number of species migrate directly from Central America to the Mississippi valley across the Gulf of Mexico, and the scarcity of these species in southwestern Texas is thus explained.

HELMUTH'S ACCOUNT

March 28, 1918. Anchored off Sabine Pass, Texas. [Describes flights of geese observed.]

March 29, 1918. *Migrants and waifs at sea.* From Sabine Pass to a point south-east in the Gulf of Mexico, 100-150 miles offshore. A "norther," with terrific wind and rain. Three Great Blue Herons (probably Ward's), lit on the main and foremast, and stayed there all day, balancing themselves against our 42 degree roll by half extending and lowering their wings to meet the motion. Among other strange visitors at a distance of 125 miles from land were a Belted Kingfisher, several Tree Swallows, and many flocks of Warblers, which seemed better able to weather the storm than the large Herons. The only Warblers identified were Myrtles, Parulas, Redstarts, and a female Black-throated Blue. Three Robins came aboard in the evening.

March 30, 1918. Gulf of Mexico, en route to Tampa, Florida. Very heavy weather, with violent squalls, wind varying in direction. A Henslow's Sparrow stayed with us all day, very tame, and ate crumbled hard-tack and drank water from the boat-covers. Passed five Louisiana Herons, making heavy weather of it.

March 31, 1918. About 85-95 miles off the entrance of Tampa Bay. Several Myrtles, a Parula, a Black and White, and one Prothonotary Warbler flew aboard and spent the morning on the boat-deck, all very tame. Strangely enough, the Myrtles ate bread crumbs and crumbled hard-tack thrown to them by compassionate sailors!

There is no question that in each of the foregoing cases the weather witnessed was a typical cold-front storm. Viewed in the light of the now-proven fact that trans-Gulf crossings occur continuously in spring, the import of Frazar's and Helmuth's observations can be understood clearly. They are merely the counterpart at sea of the tremendous concentrations of birds at visible levels that cold-front storms produce on land.

By comparison, Williams's interpretations of these data seem strained. Although Helmuth was aboard a United States Naval vessel on patrol in the Gulf, Williams questions if Helmuth knew his true positions. On careful analysis it appears perfectly clear that Helmuth's account contains no inconsistencies and, therefore, his approximate route can be plotted as I have done in Text-figure 1. Williams further claims that Helmuth's birds were not trans-Gulf migrants by listing certain species believed not to winter south of the Gulf. They are: Louisiana Heron, Robin, and Henslow's Sparrow.

However, the facts in the case are that two Louisiana Herons banded in the Galveston Bay region, on August 28, 1929, by J. W. Stiles, were recovered, respectively, about October 18, 1930, at Progreso, Yucatán, and September 6, 1931, at Laguna San José, 12 kilometers from Macuspana, Tabasco. Furthermore, the Eastern Robin (*Turdus migratorius migratorius*) winters south to western Cuba (Bond, 1940), and to southern México and Yucatán, as is proved by the recovery of a banded bird (Thomas, 1936: 113), a specimen in the University of Michigan Museum of Zoology, taken at Chichén Itzá, February 2, 1940 (Van Tyne, *in litt.*), and, finally, by specimens collected in southern Veracruz (Wetmore, 1943; Duvall, 1945). Regarding the Henslow's Sparrow seen by Helmuth on March 30, it is entirely possible that the bird was a Grasshopper Sparrow instead. The latter winters south to Guatemala and Nicaragua (Hellmayr, 1938). Granted it was a Hen-

TABLE I. COMPARATIVE GEOGRAPHICAL STATUS OF CERTAIN BIRDS SEEN BY FRAZAR

Species	Frazar's account	Florida Peninsula ¹	Brownsville Region ²
Wood Thrush	20 seen	fairly common	rare
Prothonotary Warbler	large numbers	fairly common	very rare
Worm-eating Warbler	large numbers	regular but uncommon	rare
Chestnut-sided Warbler	quite a number	very rare (one record)	fairly common
Kentucky Warbler	large numbers	very rare (three records)	rare
Mourning Warbler	large numbers	very rare (two records)	rare
Indigo Bunting	as plentiful as Red- starts (latter listed as the most abundant)	uncommon	abundant

¹ Based on Howell (1932).

² Based on Davis (*in litt.*).

slow's Sparrow, it is conceivable that at least a few winter south of the Gulf and have merely escaped detection.

Williams reasoned that because the flight observed by Frazar also contained a few birds not known south of the Gulf, none of the birds seen was engaged in a trans-Gulf migration. By the same line of reasoning, one might argue that the birds could not have come from Florida since the flight contained large numbers of birds extremely rare in that state, and, moreover, that they could not have come from Texas since the flight contained large numbers of birds extremely rare there (*cf.* Table 1). However, the fallacy of such an argument is obvious. The birds must have come from somewhere. The fact that some birds in a flight have originated from one source does not show that other birds in the flight could not have come from other sources. The idea that the bulk of Frazar's birds were trans-Gulf migrants involves at most only the assumption that strays from the mainland may mingle in a trans-Gulf flight. Williams's theory, on the other

hand, seems to require that birds were carried out to sea from three directions by a wind that was blowing from only one.

D. AUTUMNAL RECORDS

Fall migration in the lower Mississippi Valley and in the central Gulf-Coast region is totally unlike the migration in spring. It is characterized by a steady stream of migrants, appreciable numbers of individuals daily, and the regular appearance, irrespective of weather conditions, of transient species that are seen in spring only during and after cold-front storms. Apparently the general meteorological situation during the period of southward migration is a major factor in producing these results; but no exact correlations have yet been made. Whether or not the effects noted extend out over the Gulf itself, making migration there more visible than in spring, is a point that requires further study in the field. But, at any rate, the use of the trans-Gulf route in fall, as in spring, is well authenticated and is notable for the appearance of birds in flocks even during mild weather.

One hundred and twenty-two years ago, Bullock (1824) wrote as follows:

A few days brought us off Campeche, but, owing to the shallowness of the water, we were obliged to cast anchor twenty-five miles from the town. Our captain, with some of the officers, went on shore on business, and to procure a supply of fresh provisions for the voyage. During their absence we were visited by great numbers of the smaller kinds of land birds, principally warblers and flycatchers, which reached the ship in an exhausted state, on their migration from the north side of the Gulf of Mexico to the coast of Yucatan. The cabin was never without these pretty creatures, which entered the windows in pursuit of the flies, that were in great plenty. Some of them became familiar, remained undisturbed for many hours, and took the small chopped meat and water placed for them, affording me a better opportunity of observing their habits than I could have obtained on shore. The boys caught me twenty-five different species on the deck and rigging; but the attempts to keep them alive were unsuccessful, and I preserved them on the spot. Many were of great beauty and variety, and some undescribed. Among those known were the purple heron, common snipe, pigmy sandpiper, the lesser spotted rail, American chatterer, orange and black warbler, and two kinds of swallows.

Griscom (1945: 100) has described his experiences in August, 1930, while crossing between New Orleans and the Yucatán Channel, as follows: "For the two days on the open ocean, land-birds were constantly in sight, and a few boarded the vessel. Reclining in a deck-chair, I heard a sudden loud 'chip' given directly beneath me, and glancing down, saw a male hooded warbler [*Wilsonia citrina*] looking up at me with great curiosity. Barn and cliff swallows passed the steamer and a hummingbird whizzed by, all making much better time than the boat could possibly do."

Lincoln (1939: 61) and Weightman (1926) make mention of migrating land birds seen from the steamer 'West Quechee' while in the vortex of a hurricane on August 25, 1926. The birds were so numerous that they filled the air and could be scooped up from the deck by the armful. Photographs illustrating the tremendous numbers present aboard the ship appeared in an obscure publication, the 'Fireman's Fund Record' (Anonymous, 1927). The photographs show birds crowded together, wing to wing, all over the rigging, railing, and superstructure of the boat. Among them are several species—hundreds of Purple Martins (*Progne subis*) and other swallows, numerous birds the size and shape of orioles, and others the size of warblers. The hurricane in question entered the Gulf of Mexico in the vicinity of the Yucatán Channel and passed northwestward above the northern coast of Yucatán. On reaching longitude 92° W., it turned abruptly northward by eastward and then moved slowly across the middle of the Gulf, enveloping the 'West Quechee' at a point about 300 miles east of Galveston, Texas, and approximately 125 miles south of the Louisiana coast.

From 1943 until shortly after the termination of the war, the U. S. Coast Guard Cutter, 'Blanco,' was engaged in gathering weather data in the Gulf of Mexico. Observation stations were always near the "middle of the Gulf," a fact which renders observations of land birds by the boat's crew of great significance to the thesis of this paper. Conversations during June, 1945, with Captain G. A. Ruhge, C. A. Spurl, and Charles Nevitt, Jr., of the crew of the 'Blanco,' revealed that observations by them of land birds in migration across the Gulf were frequent and commonplace. Nevitt's testimony was especially significant in view of his biological background which includes an introductory college course in ornithology. Although many instances were described to me of occasions when birds of varying numbers and kinds were seen in the "middle of the Gulf," I asked them to supply me with specific records giving the dates of observation, positions of the boat, prevailing weather conditions, and the preserved wings of any birds which they could capture. The last proposition was made possible through the cooperation of the U. S. Fish and Wildlife Service in issuing necessary scientific collecting permits. The 'Blanco' was lately removed from duty in the Gulf and for this reason only one report was forthcoming from Captain Ruhge. His notes, as submitted to me, follow (the recorded position of each observation is plotted in Text-figure 1):

During the time of our patrol from August 14–30, 1945, we endeavored to obtain the information desired by you pertaining to the migration of land birds across the Gulf of Mexico with the following results:

[1] August 16, 1945. 5:00 P.M. Swallows observed (wing of this type obtained on August 26 [Barn Swallow, *g. v.*]). Position $25^{\circ} 56' N$, $87^{\circ} 03' W$.

[2] August 17, 1945. 6:00 A.M. Flocks of small birds, possibly warblers, flying south about 20 feet above the water. Much chirping was heard. Light (Beaufort Scale: 1-7 mph) SW wind. Position $25^{\circ} 56' N$, $87^{\circ} 14' W$.

[3] August 18, 1945. 10:15 A.M. Swallows observed. Wind SW, light. Position $24^{\circ} 45' N$, $87^{\circ} 21' W$.

7:30 P.M. Small flocks of warblers about 30 feet above water passing boat. Rain squalls with SSW wind. Position $24^{\circ} 45' N$, $87^{\circ} 20' W$. Also one black and white striped bird resembling a warbler [? Black and White Warbler, *Mniotilta varia*] landed for a few minutes and departed in SSE direction. At same position as above a Kingfisher [*Megasceryle alcyon*] was seen passing the ship, headed south.

[4] August 19, 1945. 7:30 A.M. Redstart [*Setophaga ruticilla*] landed on rail for a short time and departed in SSE direction. Light SSW wind and passing showers. Large dragonflies seen in quantity. More swallows seen about the ship throughout most of the day. Position $24^{\circ} 45' N$, $87^{\circ} 30' W$.

6:00 P.M. Undetermined species seen for a short time. It was slightly smaller than a sparrow; breast dull yellow (only under side observed). Position about same as last observation.

[5] August 23, 1945. Swallows, warblers, and dragonflies seen off and on during most of the day, all heading SSE or S. Noon position $25^{\circ} 48' N$, $86^{\circ} 20' W$. Light S wind.

[6] August 24, 1945. Many flocks of warblers heard passing over ship at night headed south. Position at 3:00 P.M. $24^{\circ} 20' N$, $86^{\circ} 43' W$.

[7] August 25, 1945. Swallows, warblers, and dragonflies observed at intervals during the day. Noon position $24^{\circ} 12' N$, $85^{\circ} 50' W$. Captured a warbler from a flock of thirty or forty; wing preserved [the specimen, now in the L. S. U. M. Z., is an immature example of the Yellow Warbler, *Dendroica petechia*].

[8] August 26, 1945. 3:00 P.M. Light NW wind. Captured a swallow that came aboard ship [the specimen, now in L. S. U. M. Z., is an example of the Barn Swallow, *Hirundo rustica*].

A glance at Text-figure 1, where the above observation stations are plotted, reveals clearly to what extent the records may be described as "mid-Gulf." At Station 7 the 'Blanco' was at its closest point to land—157 statute miles from Cuba, 195 from northeastern Yucatán, and 203 from Dry Tortugas. At Station 2 the boat was farthest from land, a distance of 305 statute miles from Yucatán and 312 statute miles from Dry Tortugas.

Weather conditions during the period of these observations were typical of the season in the Gulf area, as exemplified by the prevailing southerly winds, high temperatures, and local showers. Nearly all birds observed passing the boat were flying into the face of, or at an angle to, light southerly winds. Mention of birds aboard ship is in two instances associated with rain squalls and passing showers.

Possibly the most interesting single fact brought out by these notes is that "many flocks" of birds were heard passing over the boat in a southerly direction during the night of August 24. To my knowledge

this is the first instance recorded from the open Gulf of that well-known feature of nocturnal migration over land. However, the 'Blanco' provided highly favorable conditions for making such observations, for much of the time the boat was idle, moored to a sea anchor, thus eliminating the customary vibrations and sounds that accompany even large vessels in transit.

Previous mention has been made here to the effect that on the testimony of seamen who regularly cross the Gulf of Mexico, the appearance of small land birds is commonplace. Accordingly, I asked Mr. Kristian Akselsen, radioman of the 'Bertha Brøvig' which plies between New Orleans and Progreso, Yucatán, to keep a record of birds that appeared on his ship and to obtain wings of as many as he could succeed in catching. Since July, 1945, he has given me several written reports of which the following excerpt is typical: "During the last two trips [both in September], we had frequent visits by small birds on board, but all were very shy and none stayed very long." Indefinite as such reports are, they are nevertheless of some value. However, on October 9, 1945, I received from Akselsen a highly important account of an incident that took place early in October while his ship was at Progreso. In sending eight wings of birds to me, he wrote as follows: "These wings came from birds that were found on deck on the morning of October 5, while we were at Progreso. A stiff southeasterly wind had been blowing all during the night and day before, and all of the birds on the ship that were alive were plainly exhausted. There were many dead birds on deck, but they seemed to be of the two or three kinds which I am sending to you."

Since his "two or three kinds" include six species, there is little doubt that other species were present also. The wings sent are identifiable as follows: 2 Red-eyed Vireos (*Vireo olivaceus*), 1 Philadelphia Vireo (*Vireo philadelphicus*), 2 Magnolia Warblers (*Dendroica magnolia*), 1 Tennessee Warbler (*Vermivora peregrina*), 1 Water-Thrush (*Seiurus noveboracensis*), and 1 Connecticut Warbler¹ (*Oporornis agilis*).

After receiving this report from Akselsen, I met his ship on a subsequent call at New Orleans and conversed with him in detail regarding the incident and the surrounding circumstances. The boat was tied to a long pier projecting into the open Gulf and was blacked out except for two lanterns. Birds were first noted on the ship by the night-watchman, who awakened Akselsen at daybreak. At that time Akselsen estimated that no less than 40-50 birds were present, most of

¹ The identification of this wing proved extremely difficult. Neither A. Wetmore nor J. Van Tyne were able to furnish a positive identification. It seems nearest to *Oporornis agilis*, but the manus and under wing coverts are not quite as yellow as in specimens of that species which we have had for comparison. Possibly the wing came from an immature individual of that species.

which were dead or in very poor physical condition. It appears not unlikely that a segment of a very large flight of migrants arriving on the coast at that point met partial destruction by flying into the superstructure and copious rigging of the freighter as it lay between them and shore. Since the birds were arriving on the southern shore of the Gulf in the face of strong headwinds, the observation appears to represent the autumnal counterpart of spring concentrations precipitated on the northern Gulf Coast by cold-front storms.

III. THE MAGNITUDE OF TRANS-GULF MIGRATION

A. SIGNIFICANCE OF RECORDS OVER THE GULF

Let us now consider how the mass of data reproduced in Section II relates to the broad problem of trans-Gulf migration.

When we have read the complete record, one basic conclusion becomes self-evident—that non-pelagic birds appear frequently over the Gulf both in spring and fall. Though no deliberate field work was undertaken until recently, we already have definite records for 24 dates in March, April, May, August, and October, in weather ranging from calm to hurricane. Late in the summer of 1945, when southward migration was just getting under way, the personnel of the weather boat, 'Blanco,' noted passerine species on a total of eight dates out of eleven. Like most of the observers who have contributed to the long catalog of Gulf records, these men had other work to do. Had they been able to scan the sky continuously, they might well have been rewarded with results on all eleven dates. So far, I alone have made a voyage across the Gulf for the sole purpose of studying trans-Gulf migrants; and, although my trip was made after the peak of spring migration in that latitude, I recorded passerine species on every one of my four days at sea. The Frazar and Helmuth accounts are no longer isolated cases. The work of the past year has provided as many sets of Gulf observations as all the published investigations of the preceding 64 years put together. We can now appreciate that the former scarcity of records was due, not to a lack of non-pelagic birds, but to the lack of interested observers, on a route rarely traversed by ornithologists at the critical season.

Nevertheless, granted that small birds occur regularly over the Gulf, what reason have we to assume that they are actually crossing it? Is it, perhaps, possible that such birds are mere waifs that have drifted off their normal course and become lost at sea? Three facts stand in the way of the latter interpretation—the distribution of records, the presence of birds in mild weather, and the direction of flight. The

points of occurrence are not confined to coastal waters. As shown in Text-figure 1, they are strung out across the whole expanse of the Gulf. Indeed, on my own voyages between Louisiana and Yucatán, no 40 miles of the daylight distance was devoid of birds. Another sort of evidence is exemplified by the Coast Guard report of flocks of small birds at the middle of the Gulf when the force of the wind, as measured by instrument, did not exceed 7 mph. These flocks were flying counter to the direction of the wind more than 300 miles from the nearest land. Under the circumstances they could not possibly have been blown to the point of observation, and there seems to be no way to account for their location unless they were crossing the Gulf deliberately. Finally, with the single exception of a Great Blue Heron 19 miles from shore, every one of the numerous birds for which complete data are available was proceeding unerringly in the seasonal direction of migration. If migrants got lost on the Gulf often enough to explain the known records, if they did not continue on across the water in the direction observed but later reversed their course, then certainly at some time a few individuals at least would have been encountered flying the wrong way. But there is not a solitary instance of this kind on record. On the other hand, in an overwhelming majority of cases, considerations of one sort or another point to an intentional trans-Gulf flight.

We must pursue the inquiry still farther. Occasional crossings of the Gulf would not constitute migration in the accepted sense of the word, even if intentionally made. Migration implies a movement in which numbers of birds participate simultaneously. Do or do not the present data indicate whether trans-Gulf crossings come within the meaning of the term?

A total list compiled from the accounts in Section II comprises no less than 62 species. This is a formidable number—more kinds of birds than Cooke himself specifically associated with the trans-Gulf flyway. Particularly worthy of emphasis are the Myrtle Warblers encountered by Frazar on the day *before* the storm, the Mourning Dove 177 miles off the coast of Yucatán, and the Yellow-throat 100 miles below the mouth of the Mississippi when the breeze was blowing not *from* but *toward* the shore. These records and their surrounding circumstances prove that the winter-resident status of a species on the Gulf Coast provides no basis for assuming that individuals of that species do not traverse the Gulf of Mexico. A second interesting feature of the list is the inclusion of birds not ordinarily thought of as trans-Gulf migrants. In this class, the swallows, represented by three species, are especially numerous—a result that may be partly attributed to their habit of low flight and their resulting conspicuousness.

Much of this is incidental. Evidence of migration can be only partly predicated on variety of species. We cannot ignore the fact that many of the lists made on days when the birds were not faced with headwinds are notable for the low count of individuals. In cases where the observations were only casual, this would seem to require no particular explanation. However, my own records, based on a continuous search for birds during daylight, show only 11 individuals on the return trip from Progreso, an average of less than six individuals per day. Ornithologists who think of migration in terms of their own experience during the northern spring may say to themselves that this is not migration. And so it is not—intrinsically. But it is indicative of far more than meets the eye. The fact of the matter is that the situation out on the Gulf parallels almost exactly the situation with respect to transients in the coastal regions of the Gulf in spring. I say *almost* exactly because there is one difference. In calm spring weather one does encounter some transients offshore, but in lower Louisiana such conditions usually bring into view only species that breed in the region and such low-flying migrants as the swallows. One specific illustration will suffice to emphasize this point. Among the many transient migrants that have been seen over the Gulf in fair weather was a Black-throated Green Warbler that boarded my ship on the morning of May 11, 66 miles off the coast of Louisiana; yet on the mainland north to Baton Rouge I have never, during 13 years of intensive field work, found this species in spring except in the wake of polar-front storms.

To repeat, the bulk of spring migration in the Gulf coast regions is an unseen phenomenon, becoming visible only in bad weather. Gulf ornithologists agree that this is true whether the observer is working in Florida, Georgia, Mississippi, Louisiana, or Texas. All have been forced to a common conclusion—that most transient migration is performed at such high altitudes that it is virtually undetectable. If this is true over land, there is no reason to expect that it will be less true over water. Successful observation on the Gulf would seem to hinge on the same sort of circumstances that precipitate birds on the coast, and the results that have recently been achieved in fair weather can be nothing short of astonishing to anyone familiar with the situation on land.

The really perplexing thing, therefore, about trans-Gulf migration is not that it has produced so few records but that it has produced so many. Why should we find any transients at all over the Gulf during fair weather, when under similar conditions on the coast we do not find any? So many uncertainties still attach to the mechanics of

migration that any answer must be frankly speculative. But the actions of the birds themselves suggest a plausible hypothesis. Briefly, it is this—that spring observations of migrants on the Gulf are made possible mainly by the attraction of the ship, which depends in turn on the individual degree of fatigue of the birds flying high overhead. Let us examine the probable workings of this principle in greater detail.

The ability of small birds to cross stretches of water more vast than the Gulf of Mexico is amply attested by their appearance on islands in the open seas. There is little reason to doubt that the *average* bird under *average* conditions can pass from the peninsula of Yucatán to the coast of Louisiana in one flight without tiring unduly and yet continue on for some distance inland. In my opinion, the attitude of such birds to the ships passing below is one of complete disinterest, and they stream over unseen. However, in any aggregation as large as the trans-Gulf flights, there are surely many degrees of fitness. The sub-standard individuals must find the trans-Gulf crossing an ordeal of increasing severity. They, I think, furnish the bulk of the records in fair weather. The degree of fatigue, as well as the numbers affected, increases as the journey lengthens and is reflected in the bird's behavior. Except in the case of low-flying migrants like the swallows, even those individuals which pass the ship without stopping but come down close enough to be seen are probably in most cases beginning to feel the first hints of approaching fatigue. I do not mean that they are in actual distress but that they are beginning to experience physical and psychological reactions that would prompt their alighting if a suitable opportunity presented itself. As soon as they see that human beings are present, they decide not to stop. Later, as the strain increases, some of them abandon more reluctantly the impulse to pause and therefore begin to circle the ship. The stage where a bird actually boards a ship does not represent exhaustion in most cases, but it seems to indicate a state of discomfort where the bird's desire for rest is greater than its suspicion of man or the strange experience of alighting on a ship's deck.

Fatigue may be intensified by adverse winds to an astonishing degree. Let us study in the light of current aerodynamic theory (*cf.* Allen, 1939) the case of a bird capable of migrating at a speed of 30 mph. in still air. If there were no wind at all, such a bird could traverse the shortest north-south route across the Gulf in a little less than 18 hours. But suppose that it were traveling in a 20-mile tail wind. Then, it would move forward at the speed of the wind plus its original speed and would complete the crossing in a little over 10 hours.

Conversely, if it were proceeding against a 20-mile wind, its effective speed would be reduced to 10 mph. and it would need over 52 hours to cover the distance. Whether or not migrating birds attempt to compensate for the effect of wind by regulating their air speed, the result would be the same in terms of expended energy. The journey would take approximately five times as much effort in a 20-mile head wind as in a 20-mile tail wind.

However, wind direction and velocity often vary at different altitudes; the wind sometimes blows in opposite directions at levels only 1000 feet apart. Thus, migrants could seek favorable elevations and escape the consequences of continuous flight against adverse wind.

The effect of wind and distance on the number of birds seen is graphically illustrated by the notes in Section II. In spring, weather conditions being equal, more birds are always seen over the upper part of the Gulf. For example, on my trip to Yucatán, I saw 11 species comprising 37 individuals on April 30 when crossing the northern half of the Gulf, in contrast to only two species and 14 individuals on May 1 when my ship was in the southern half of the Gulf. On the return voyage, four species represented by single individuals were seen on May 10, whereas seven species and as many individuals were seen on May 11 when traversing the northern part of the route.

Howell's observations reveal that moderate to fresh adverse winds increase the number and variety of birds seen in a given period of time as well as their discernible state of weariness. His birds were apparently suffering greatly from fatigue, for not only did all of them come aboard the ship with one exception, but they were noted sleeping on the ship during the daytime. Only in the case of the Barn Swallows on April 30, did any of my birds show visible weariness. Obviously two sets of factors were in operation on the dates of our respective observations. Although the skies were generally clear during Howell's crossing of the Gulf, a moderate northerly wind was blowing in the central Gulf area on May 3-5 (*vide* U. S. Weather Bureau, New Orleans; also *cf.* Daily Weather Maps) as a consequence of a cold front which passed southeastward across the western part of the northern Gulf Coast around midnight on May 2-3. Since these northerly winds did not reach the extreme southern Gulf area in force, birds departing from southern México did so under generally auspicious conditions. However, on reaching the central part of the Gulf they encountered head winds, which were gentle to moderate and apparently sufficiently strong to hinder northward flight by materially reducing the birds' ground speed. The wind direction and velocity at a Weather Bureau observation station near the middle of the Gulf (25° N., 90°

W.) on May 4 was NNW., 8-12 mph. at 12:30 P. M.; NNW., 13-18 mph. at 6:30 A. M.; N., 13-18 mph. at 12:30 P. M.; N., 13-18 mph. at 6:30 P. M.

Frazar's birds exhibited, in part, the maximum degree of fatigue, for some of them were unable to make headway against the wind and were swept into the sea. Yet his birds had flown farther. In fact they were nearly across the Gulf and were about to make a landfall when they met a storm of "gale" intensity. Helmuth tells of "terrific wind and rain" at the time some of his birds came aboard his ship, but he speaks of no fatality and even states that "several Tree Swallows and many flocks of warblers were better able to weather the storm than the large herons."

Thus, the distance that a bird has traveled and the winds and other weather conditions it has encountered appear to be of tremendous import in determining the number of birds one might see while crossing the Gulf. If this were not the case, one should be able to count at least as many birds during fair weather on the coastal islands and ridges as are seen on the Gulf during auspicious weather. But on land there is one great difference. There may be just as many, or more, weary individuals, but there is no longer anything to attract them into the range of the observer. They probably drop down over such a wide area that the observer might scour the thickets all day without finding a single one.

So much for the principle of increasing fatigue. Let us further examine the records in Section II as part of an over-all picture of trans-Gulf migration. Certain existing records of birds over the Gulf correlate with observations on land during fair weather, and other observations also parallel exactly the situation on land during adverse weather. As previously pointed out, Frazar and Helmuth are the only two competent observers who have encountered cold-front storms on their trips at sea. Each observer noted great numbers of passerine birds; Frazar's notes suggest possibly as many as 400 or more individuals in the short interval of several hours. Since great concentrations of migrants are always noted on the central Gulf Coast after cold-front storms, the fact is apparent that Helmuth's and Frazar's observations are a counterpart at sea of a now well-known phenomenon on land. But they are no more than what we might expect from previous considerations regarding the scope of trans-Gulf migration. We have seen that in fair weather on the Gulf most birds are passing over at elevations too high to be detected and that the number and variety increase in direct ratio with increasingly adverse weather conditions. Now, in the final stage, we observe that a cold-front storm brings down

the entire overhead flight to visible levels. Frazar's and Helmuth's records can hardly be regarded as anything but a visible demonstration of the immensity of trans-Gulf migration.

B. COASTAL OBSERVATIONS OF THE ARRIVAL AND DEPARTURE OF
TRANS-GULF MIGRANTS

Further evidence of the magnitude of trans-Gulf migration is to be found in the large flights of birds observed from time to time arriving and departing at the two ends of the trans-Gulf route. This type of evidence will be illustrated here by the accounts of two sets of observers, one in Yucatán, one on the northern Gulf Coast.

Recently, Van Tyne and Trautman (1945) published some highly significant observations made by them in Yucatán. They recorded witnessing the actual departure of an impressive number of birds from the northern coast of Yucatán. During February and March, 1936, numerous flocks of Turkey Vultures (*Cathartes aura*) were seen migrating in a northward direction over the coast. On April 1, 1936, all but a few individuals of some 60 Ruby-throated Hummingbirds (*Archilochus colubris*) noted near the front beach between Progreso and Chicxulub were observed to leave the land and disappear to the northward over the Gulf. Similar observations concerned a Sparrow Hawk (*Falco sparverius*), numerous Barn Swallows (*Hirundo rustica*), and the Least and Semipalmated Sandpipers (*Erolia minutilla* and *Ereunetes pusillus*), all of which were observed leaving the coast near Progreso and flying northward. Of special importance, however, is their note to the effect that "throughout each day, and occasionally during early evening in the spring of 1936, small birds, warbler size and with the *chips* of warblers, flew northward across the beach near Progreso and continued over the ocean." On the evening of March 30, between 9:00 and 11:00 P. M., "an unusual number" was said to have passed over.¹

For similar observations of arrival and departure of birds on the northern Gulf Coast I am privileged to publish here in full (*cf.* also, Weston, 1930) for the first time two highly significant observations by Francis M. Weston, of Pensacola, Florida. The evidence of trans-Gulf migration that these notes adduce is apparent and therefore requires no elaboration.

¹ In this connection I might add that lighthouses along the northern coast of Yucatán are said to attract and kill migrating birds during inclement weather. I conversed at length with the lightkeeper at Progreso and was told that sometimes great numbers of small birds are found dead at his light in autumn, this being the only time during migration seasons when rainy nights ordinarily occur at that place.

October 24-25, 1918. This full-moon night was spent by me and a companion in camp at Gulf Beach, an unfrequented (at that time) open beach backed by sand dunes, about 15 miles southwest of Pensacola, Florida. The sky was cloudless, there was no wind, and the gentle surf on the beach made no sound that could be heard at our camp site back among the dunes.

Beginning shortly after dark and continuing steadily until at least 3:30 A.M. (when I finally went to sleep), small birds of several species (to judge from the variety of sounds that they made) were passing overhead in groups of varying size. The tinkling medley of chirps of each group first became audible well to the northward of us, high in the air over the woods and swamps of the back country; then passed over our listening post; then were lost in the distance to the southward, far beyond the shore line and well out over the Gulf. Hardly would the sounds of one group become inaudible in the distance before another would be heard approaching from northward. The flight direction of every group was from north to south without variation or interruption, and none was heard to turn back or to pass in any other direction. There was no means of making an estimate for there could have been many silent members in each group. All that can be said with certainty is that, in the course of the night, many hundreds of birds traversed the tiny hemisphere of sky that lay within our radius of hearing.

The only sound then recognizable to me was the chirp of the Bobolink. I had long known this bird on the Atlantic coast, and had always regarded its distinctive chirp as one of the very few identifiable sounds made by passerine birds during migratory flight. The first group of migrants that passed over early in the evening was made up largely of Bobolinks, and others were heard off and on during the period of observation. The great majority of the chirps heard came from warblers and vireos of several species—this being only a guess at the time, but it is borne out now by my many years of observation of the birds of passage that are most abundant in this region in the second half of October.

Assuming a reasonable average flight speed of 20 mph, and assuming that passerine night migrants do not start their flights in darkness, we can infer that the first group of birds that crossed the beach line that night came from a point not less than 20 miles inland. The birds that passed at 3:30 A.M.—eight hours later—had already traveled 180 miles or more. Their next landfall, if they did not vary their line of flight, was the coast of Yucatán 584 miles away!

April 29, 1945. Pensacola, Florida. Santa Rosa Island: In the course of the forenoon, 3 loose flocks of from 15 to 25 Nighthawks (*Chordeiles minor*) had been seen flying northward overland, coming from the direction of the open Gulf and making slow progress against a fresh northerly wind. Finally, at about noon, I saw with the aid of binoculars a fourth flock actually coming in over the Gulf. When first seen, the flock was perhaps a quarter mile offshore, the birds in close formation and flying so low over the water that, from my position high up on the beach, they could hardly be seen against the background of waves. They held their course at the low elevation until they reached the beach, then spread out into a straggling flock, rose to a height of about 50 feet, and passed inland after the manner of the earlier flocks. This episode refutes the preconceived idea that the Nighthawk, one of the few species of land birds capable of feeding while in flight, reaches this region solely by overland flight around the Gulf of Mexico. FRANCIS M. WESTON.

We have reviewed three strong indications of the vast scope of trans-Gulf migration: (1) the similarity of transient migration over the Gulf

and transient migration over the adjacent land; (2) the tremendous numbers of birds recorded by Frazar and Helmuth during cold-front storms offshore; and (3) some of the observations of the number of low-flying migrants arriving and departing from both the northern and southern Gulf coasts during seasons of migration. While these considerations are of tremendous force, especially when taken together, they are conceivably subject individually to other interpretations and hence do not constitute positive proof. Can the intensity of trans-Gulf migration be subjected to a more decisive test? Can less circumstantial proof be secured? Fortunately, the answer is in the affirmative. Such a test was made on May 5 and 6, 1945, during my stay in Yucatán and should erase any lingering doubts as to the scope of trans-Gulf migration.

C. TELESCOPIC STUDIES OF MIGRATION AT PROGRESO, YUCATÁN

During the weeks preceding my trip to Yucatán, I had become intimately familiar with a method of obtaining valuable data on nocturnal migration. Painstaking telescopic studies were begun at Baton Rouge in late April of birds passing before the moon. In this undertaking I had the indispensable assistance of Dr. W. A. Rense, Professor of Physics and Astronomy at Louisiana State University, who devised mathematically precise reductions of the data, and of H. B. Boudreaux and Robert E. Tucker, who devoted many long hours to the actual observations. The results achieved and the details of technique, which follow in general lines laid down by Winkenwerder (1902), Stebbins (1906), and Carpenter (1906), are too extensive to be appended here and will be published separately after completion of additional work now in progress. A paper by Rense (1946) covering astronomical and mathematical aspects of the problem has already appeared.

Here, it is sufficient to tell what the method accomplishes. Virtually all birds passing between the telescope and the moon can be seen and counted. Their apparent paths can be plotted on diagrams of the moon and the true average direction of flight later computed by formula. Species can seldom be identified, but to an experienced observer there is no confusion whatever between an object that streaks by at low level and a bird that crosses before the moon's disc high above the earth. The space under observation has the shape of a slender, inverted cone, averaging only 30 feet in diameter at the 2000-foot elevation. Because of the upward widening of the cone, the dimensions of the section in which birds actually appear vary with the altitude of the birds, as well as with the changing phases and positions of

the moon. All of these factors can be determined astronomically. Obviously, the birds that can be seen in the space under observation provide only a tiny sample of the total number in the vicinity, and even a vast flight will be represented by a relatively small number of recorded individuals. The intensity of migration can better be visualized if the foregoing data are used to compute the flight density, *i. e.*, the theoretical number of birds per hour passing over a one-mile line on the earth's surface at right angles to the average direction of flight. This concept makes it possible to compare rates of migration at different points on a statistically equal footing. In computations of density it is mathematically accurate to assume that all birds are flying at a median altitude of flight density. The experience of Carpenter and Stebbins (*loci cit.*), supported by actual parallax measurements of the altitude of flight made at Baton Rouge, indicate that the median point does not exceed 2000 feet. This is the figure employed in the present calculations.

On the mornings of May 5 and 6, 1945, this tested method was put to work at Progreso. I used a 19.5-power B. and L. Spotting Scope on a tripod with an adjustable head, mounted on the deck of the 'Bertha Brøvig.' The ship's radioman, Kristian Akselsen, showed great interest in the problem and mounted the ship's telescope on a machine-gun turret above the bridge to make simultaneous observations and thereby become acquainted with the technique. The ship lay motionless at a pier about 100 yards from shore, but the diurnal path of the moon was such that the portion of the sky under observation was largely over land. The waning moon rose late, confining the work of both mornings to a short period before dawn.

The results are summarized in Table 2. Several of the observations made at Baton Rouge are included as a standard of comparison. *All of the migrating birds counted at Progreso were flying almost due north, out over the Gulf, in the direction of the coast of Louisiana and*

TABLE 2

Location	Date	Interval (hours) ¹	Central Standard Time	No. of Birds	Flight Density
Baton Rouge, La.	April 25	1.17	7:45- 8:55 P.M.	89	10,030
Baton Rouge, La.	April 25	.75	9:08- 9:53 P.M.	26	6,205
Baton Rouge, La.	April 25	.67	10:45-11:25 P.M.	9	2,975
Baton Rouge, La.	April 26	1.63	7:50- 9:28 P.M.	23	2,550
Baton Rouge, La.	April 26	2.50	10:35- 1:04 A.M.	32	2,635
Progreso, Yuc.	May 5	.75	2:45- 4:00 A.M.	12	3,710
Progreso, Yuc.	May 6	1.00	3:20- 4:20 A.M.	8	1,960
Baton Rouge, La.	May 18	1.00	8:30- 9:30 P.M.	3	1,302

¹ This represents the actual length of time the moon was under observation. "Times out" for making adjustments on the tripod, for recording the altitude and azimuth of the moon by instrument, or for periods when clouds were in front of the moon, etc., are thereby accounted for.

Mississippi. A glance at a map will show that the location of Progreso, far out at the northern extremity of the Yucatán Peninsula, excludes all probability that these birds might later have turned to avoid a Gulf crossing.

These data furnish only a hint of the important facts that may come to light as this line of investigation is continued. But already they permit conclusions of far reaching significance. The observations at Progreso were made over six hours after dusk. Therefore they probably represent birds that had been on the wing during most of the night, birds from the southern part of the Yucatán Peninsula or points even farther south. We now know that trans-Gulf migrants leave the coast of Yucatán at times other than the much cited 'late afternoon or early evening.' Since they doubtless leave then, too, as well as at other hours (Van Tyne and Trautman, *loc. cit.*), it becomes still easier to understand why birds appear on the northern shores of the Gulf at any hour when forced down by bad weather.

Most important of all, the densities at Yucatán show a close numerical relation to the densities at Baton Rouge. To be sure, there are difficulties. Flight densities vary not only with location but also with the hour of the evening, with different weather conditions, and with all the changes in attending factors that go with a different date. Moreover, because of the varying flight speeds of individual migrants, the composition of a given segment of flight changes from hour to hour. Hence, no single density at Baton Rouge is strictly comparable with the 3-4 A. M. observations at Progreso. However, taken as a whole, the table shows that during the period considered, the seasonal trend in observations is consistently downward. The densities at Progreso fit this trend as perfectly as though they, too, had actually been recorded at Baton Rouge. In other words, observations so far show migrants leaving Yucatán at rates sufficient to account for rates at which they have appeared in Louisiana. It is too early to say that trans-Gulf migration is the only source of nocturnal flights up the lower Mississippi valley, but at least we have a clear indication that it is a major source.

The flight-density concept has its soundest application as a means of correlating and comparing sets of observations, as has just been done. It is primarily a statistical quantity and does not necessarily express the number of birds actually present on a given one-mile front during a given hour. However, conditions along the whole middle section of the northern coast of Yucatán are remarkably uniform. It is a rather flat region unmarked by rivers and other physiographic features that birds might be presumed to follow in migration. There is a good

chance that telescopic data from any station in this area will provide a representative sample of the whole. There is no reason to assume that flight densities at Progreso, 40 miles east of the western 'corner' of the peninsula, are greater than at any other point along a 100-mile stretch of the coastline. Even allowing for a wide margin of error, we can safely conclude from these densities that, on May 5 and 6, 1945, birds were passing northward over the coast of Yucatán by the hundreds of thousands.

Therefore, the flight densities at Progreso lend factual support to the already inevitable conclusion that the birds seen out over the Gulf are merely the visible fraction of an immense flight passing high overhead. The long-standing view that trans-Gulf migration is of vast proportions is sustained.

D. BASIC FALLACIES IN THE ARGUMENTS AGAINST TRANS-GULF MIGRATION

Now that the flight of birds across the Gulf has been directly demonstrated, Williams's arguments against the theory of trans-Gulf migration automatically lose significance. Yet it may not be generally apparent just what was wrong with them.

To begin with—and this point is very fundamental—Williams apparently failed to recognize that trans-Gulf migration and coastwise migration are not mutually exclusive operations. To prove the one is not to disprove the other. To show that some birds migrate up the coasts of Texas and México is not to show that they all do. If so, it would disprove not only trans-Gulf migration but migration up the coast of Florida as well.

To be sure, this works both ways. Proving that birds migrate in numbers across the Gulf does not prove that others do not make the journey by the coastal routes. But that is exactly the point. No one has ever pretended that it does. From the first moment that Cooke proposed the theory of trans-Gulf migration, he recognized that several species of birds travel mainly by the coastal route while others do so in part. Subsequent ornithologists (Chapman, 1926 ed. *et seq.*; Wetmore, 1926; Lincoln, 1935 and 1939) did much to amplify this consideration. Thus it is strange that such birds are the very same ones that bulk large in Williams's direct evidence for coastwise migration—the diurnal flyers and the littoral feeders—herons, terns, shorebirds, geese, hawks, and certain swallows. Besides these, there are many land birds that winter in México for which a direct line of flight to the summer home would not cross the Gulf at all.

Because Texas, itself, is to all intents and purposes a part of the

northern Gulf Coast, conclusive observations tending to enlarge the proven scope of coastwise migration can never be sought there. When we see birds in the middle of the Gulf, we know that they could get there only by flying over three hundred miles of water and that they can get away from there only by flying over three hundred more. But when we observe birds on the coast, there is no certain way of knowing from which direction they have arrived. This is especially true on the coast of Texas where so much of the coastline lies parallel to the general north-south trend of migration.

Williams presented a table of 56 species of migrants which purported to show an overwhelming abundance of species and individuals along the sides of the Gulf and their corresponding rarity in the middle of the Gulf Coast region. Aside from omitting a number of critical species, Williams based his table on his unexcelled knowledge of the bird life of the northern Texas coast, where, naturally, he was able to show impressive representations. But for information on the other regions he had to rely on published reports. In regard to the central Gulf Coast region especially, there is a wealth of unpublished data which renders practically every one of Williams's designations of status hopelessly misleading. Indeed, this also appears to be true of every region except the one with which Williams had firsthand knowledge and on which he can authoritatively speak. For example, there are notable inconsistencies in his table with respect to the lower Texas coast and with information which L. Irby Davis has kindly supplied me (*in litt.*) regarding the status of migrant species in that region. For instance, Williams records the Golden-winged and Blue-winged Warblers as "regularly and frequently seen" on the lower Texas coast, but Davis considers these as rare migrants. Many others listed by Williams as "regularly and frequently seen" on the lower Texas coast merit from Davis the much more moderate ascription, "uncommon migrant."

These inconsistencies are merely illustrative of the fundamental fallacy which the table presents. To draw up such a table on the basis of all of the facts would be a gigantic undertaking that would dwarf many current works in ornithology of even broad scope. Such a table would have to include every species that winters south of the Gulf, wholly or in part, and it would have to be based on the hundreds of published and unpublished records of each bird. Furthermore, some system would have to be devised whereby proper cognizance would be taken of the varying amounts of field work in the different sections, since the number of records of any species is in direct proportion to the number of man-hours spent in the field.

Williams emphasized that on the Texas coast migrants are often abundant close to the shore, but that a short distance inland they are notoriously rare or absent. This, to him, represented evidence of coastwise migration. However, I feel confident I have already amply demonstrated both here and elsewhere that this same situation holds true along the entire 700-mile breadth of the northern Gulf Coast. The logical explanation lies in the principle of the coastal hiatus: birds approaching land from across the Gulf in the face of strong adverse winds come down on the first available land and hence pile up in tremendous concentrations on coastal islands, ridges, and cheniers. In other words, birds hard pressed to reach shore seek the shelter of their first landfall and do not attempt to cross the miles of extensive marsh lands that usually lie back of the coast. It is significant that this principle fits the situation on the central Gulf Coast as well as it does the Texas coast.

The theory of trans-Gulf migration is admittedly fraught with enigmas and, for this reason, there may have been some who hastened to abandon it when an alternative was presented, simply because the 500-mile over-water flight puts such a strain on our credulity. We are asked to believe that small birds are either capable of flying at many times the speed they have been observed to fly over land, or else that they can remain in the air for a considerable period without food or rest. However, the coastal migration theory offers a superficial alternative. By postulating that the birds fly entirely near land, we at least have a place for them to come down when they are exhausted. Doubtless there are some who up to now have subscribed to Williams's theory because of this possibility. However, the alternative that this viewpoint presents is not valid, even as a basis for speculation. Williams agrees that even he does not see many birds in fair weather, and examination of the reports of Davis (*loc. cit.*) from the Brownsville region of southern Texas reveals likewise that during periods of fair weather very few transients are seen. Consequently, we are being asked to believe that the birds stay out of sight up in the air as they pass along the Texas coast. Our credulity now suffers a greater shock than before. Instead of struggling with one 500-mile flight, the birds must fly continuously over twice that distance if they follow the general coastline. The coastal route is the long way around.

Still, this is precisely what Williams's theory of coastal migration postulates in its restricted sense (*i. e.*, on the premise that there is no trans-Gulf migration). The well-known and frequent concentrations of thousands of small transient land birds on coastal islands and ridges along the northern Gulf shore and near the mouth of the Mississippi

River must necessarily come from somewhere. Since Williams's thesis is that they do not come from across the Gulf, he simply extends his hypothesis that nearly all birds migrate up the coast of eastern México and Texas on one side, and Florida on the other. On reaching the northern Gulf Coast he has many of them turn abruptly eastward or westward, as the case may be, and fly something like 400 miles from either direction toward the Mississippi Delta, whence again they make another abrupt right-angle turn and proceed up one of the rivers flowing into the Gulf. Therefore, Williams's concept of coastwise migration requires that birds fly a much greater distance over land by a circuitous route than would be necessary if they crossed the Gulf directly.

Williams's paper deals only with spring migration. Therefore we do not know if he considered fall migration across the Gulf beyond refutation, or, on the other hand, if he thought 'disproving' trans-Gulf spring migration automatically disproved trans-Gulf fall migration.

Williams's *Season* reports in 'Audubon Magazine' discussing the status of the bird life on the Texas coast are great contributions to Gulf Coast ornithology. Consequently, it may be hoped that we can look to him ultimately for the irrefutable direct evidence that Cooke was correct when he proposed many years ago that many land birds migrate to and from eastern México by way of the Texas coast.

SUMMARY

Scores of records of 62 species of birds seen crossing the Gulf of Mexico during the period of migration are now available. The intentional nature of these crossings is demonstrated by the fact that all except one of these birds was proceeding in the seasonal direction of migration. Trans-Gulf flights of tremendous magnitude are indicated by the exact parallel between the phenomena of migration over the Gulf Coast regions and over the Gulf itself, by observations of flocks of low-flying migrants seen from land at the beginning or at the end of their trans-Gulf journey, and by the high flight densities over the coast of Yucatán in spring as revealed by telescopic studies. All evidence adduced by other workers to show that land birds migrate by coastal routes exclusively is compatible with the theory of trans-Gulf migration when it is properly understood.

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PHOEBES IN CENTRAL NEBRASKA

BY H. ELLIOTT MCCLURE

Two species of phoebes, the Eastern Phoebe (*Sayornis phoebe*) and Say's Phoebe (*Sayornis saya saya*), occur in central Nebraska. In eastern Nebraska the Say's is rare, while in western counties the eastern species is seldom found.

In the summer of 1941, phoebes were noticed nesting upon the upper surfaces of stringers beneath irrigation and road bridges. Nests were observed at 76 bridges within 20 miles of Ord in 1942 and at 95 in 1943. They were checked at weekly intervals, fledgling phoebes were banded, and a record was kept concerning the numbers of young raised and the use of bridges by the two species.

Central Nebraska is almost at the westernmost limit of the range of

the Eastern Phoebe. This species was not as abundant as the Say's whose nests were 4.6 times as numerous as those of the eastern bird. In the 1942 study, the nesting activity of each species was not separately recorded.

Over half of the bridges under observation supported new or old phoebe nests. On average, 40 per cent of the bridges were used for first broods and 29 per cent for second broods. This would indicate that 73 per cent of the phoebes nested a second time, if we assume that all that renested returned to their home bridges. By actual count, only about 51 per cent of the nests were used twice in a season, but many pairs probably sought other sites for their second attempts. If any young left a nest, the nest was considered successful for the season and for that particular brood. The study showed a two-year average success of 78.5 per cent for the first brood and 76 per cent for the second brood. A stream broke into an irrigation canal and flooded nests under observation in 1942 so that success of second broods was lower. For all nests under observation the average success was 77 per cent. Data in Table 1 concerning number of eggs laid and percentage of hatch are probably inaccurate, because nests were often found after the young had hatched. The average number of young fledged is only slightly greater for first broods than for second ones.

TABLE 1
RECORDS CONCERNING THE NESTING OF PHOEBES BENEATH BRIDGES IN
CENTRAL NEBRASKA, 1942-1943

	1942	1943
Number of bridges examined	76	95
Number of bridges with phoebe nests	43	51
Percentage of bridges having old or new nests	55.2	53.7
Percentage of bridges with active nests, first brood	35.5	44.2
Percentage of bridges with active nests, second brood	20.0	38.0
Number of nests	48	51
Percentage of success of nests	70.0	84.5
Number of first broods	27	43
Number of successful first broods	20	35
Percentage of success, first brood	74.0	83.0
Number of young raised in first brood	97	136
Average number of young in first brood	4.85	4.4
Number of second broods	15	36
Number of successful second broods	10	31
Percentage of success, second brood	66.0	86.0
Number of young raised, second broods	40	94
Average number of young in second brood	4.0	4.0
Percentage of nests used for both broods	55.0	47.0

TABLE 1—*Continued*

	1942	1943
Number of eggs laid	157	297
Number of eggs hatched	142	230
Percentage of hatch	90.0	77.4
Average number of phoebes raised per bridge	1.8	2.6
Estimated total from bridges in county	403	582

Both species nested about farm and town buildings as well as beneath bridges. It was thought that it might be possible to derive an index of the number of phoebes present through a systematic search of the bridges in any one vicinity. Using the average number of birds reared per bridge and the total bridges in a county it should be possible to indicate something of the population density. Valley County has some 224 irrigation and road bridges, and from the information procured from the bridges under observation it was estimated that over 400 phoebes were raised in 1942 and nearly 600 in 1943.

The Say's is larger than the Eastern Phoebe, has a yellowish-tan breast and a slightly different call, and the young have more yellow or brown in their feathers than do those of the Eastern Phoebe. There is very little that distinguishes the nests of the two and, similarly, the eggs are almost identical in size and coloring. Both species commonly lay four or five eggs at a setting, but a few of the Say's nests have been found which contained seven young. When fewer than three eggs were noted in a nest, it was believed to be the result of egg losses. The average number of young reared (Table 2) is slightly higher for the eastern species than for the western. Both species show a high percentage of success in rearing young for both first and second broods. Of the first brood, 91 per cent of the Say's and 90 per cent of the eastern young were successful in leaving the nest. Of the nests under observation 90 per cent of Say's and 100 per cent of Eastern's young of second broods left their nests. No attempt was made to determine survival after they left the nest.

W. P. Smith (Auk, 59: 410-417, 1942) noted that second broods were exceptional at Wells, Vermont, at a latitude of 44 degrees north and M. M. Nice (Bird-banding, 13: 187, 1942) found them the rule in central Massachusetts at 42° N. latitude. Ord is in the vicinity of 41.5° N. latitude. In 1943, first broods of Say's young were banded between May 23 and July 2. The bulk of first broods under observation were banded June 10 and June 25. Second broods reached banding age between July 10 and July 29. The bulk of these were banded July 21. The Eastern Phoebe had young of bandable age

between May 16 and June 16. The second brood of similar age extended between July 10 and 22. Smith indicated an incubation period of 14-16 days for the eastern species and a juvenile period of 15-17 days. In Vermont, the first brood left June 16 to July 2 and the second brood in the last of July. Both periods coincide closely with the data from Ord.

Even though the nests are usually above water when placed on projections beneath a bridge, the young do not leave until fully capable of flight, hence there is very little loss from drowning. Such locations offer excellent protection against snakes, predatory mammals and birds. This, no doubt, accounts for the high success of nesting activities.

TABLE 2

COMPARISON OF NESTING OF SAY'S AND EASTERN PHOEBES IN NEBRASKA

	Say's Eastern	
Average number of young raised, first brood	4.3	4.5
Average number of young raised, second brood	4.0	4.1
Number of nests observed	42	9
Percentage of success, first brood	80	86
Percentage of success, second brood	86	86
Number of first broods observed	36	7
Number of second broods observed	29	7
First brood, percentage of eggs to hatch	85	100
First brood, percentage of nests successful	80	86
First brood, percentage of young to leave nest	91	90
Second brood, percentage of eggs to hatch	77	83
Second brood, percentage of nests successful	86	86
Second brood, percentage of young to leave nest	90	100

It is the common modern trend to streamline all man-made structures. In many instances there are great advantages in doing so. Modern bridge construction is tending more and more to smooth surfaces, leaving no projections and no exposed timbers. The bridges under observation were used not only by Phoebes, but by Mourning Doves (*Zenaidura macroura*), Robins (*Turdus migratorius*), Catbirds (*Dumetella carolinensis*), House Wrens (*Troglodytes aedon*), domestic pigeons (*Columba livia*) and English Sparrows (*Passer domesticus*). The use of creosoted or treated timbers in construction of the bridges did not in any way deter these birds from nest building. Other things being equal, it is more desirable to have road engineers build bridges which support this wildlife population than to build those which are of no use to the birds and mammals that might come in contact with them. It seems to me that, if in the future we are going to be able to maintain our native fauna even in small numbers, so

small a thing as the construction of road bridges should not be overlooked when by minor changes it is possible to allow for the increase or maintenance of several species of our beautiful and beneficial birds.

In central Nebraska the two species of phoebes, Say's and Eastern, are present in a ratio of 4.6 Say's to one Eastern. Both are commonly found nesting beneath bridges. They both average slightly more than four young per brood for two broods. Determining the average number of young raised per given number of bridges presents a usable method of estimating changes in phoebe populations in areas as large as or larger than counties.

Ord

Nebraska

A SYSTEMATIC STUDY OF THE MAIN ARTERIES IN THE REGION OF THE HEART—AVES XVII COLYMBIFORMES, PART 1¹

BY FRED H. GLENNY²

INTRODUCTION

GARROD (1873) reported that *Colymbus glacialis*, *Alca torda*, and *Uria troile* presented two carotid arteries (aves bicarotidinae normales), while *Podiceps cristatus*, *Podiceps minor*, and *Arctica alle* had but one carotid present—on the left side.

Although the present writer has not had an opportunity to check Garrod's findings in these respects, further studies on this group of birds have shown that still other species present the condition referred to by Garrod as "aves laevo-carotidinae."

MATERIALS

Only single specimens of *Podilymbus podiceps* (Linnaeus), *Colymbus grisegena holböllii* (Reinhardt), and *Colymbus auritus* Linnaeus were dissected and diagrams of the arterial arrangements prepared.

Materials for this study were made available by Dr. Alexander Wetmore and Dr. Herbert Friedmann, United States National Museum, and Mr. L. L. Snyder, Royal Ontario Museum of Zoology.

OBSERVATIONS

The basic family arrangement-pattern of arteries in the neck and thorax is characteristic for the species studied. The aortic root (1)

¹ Contribution of the Department of Zoology, University of Toronto.

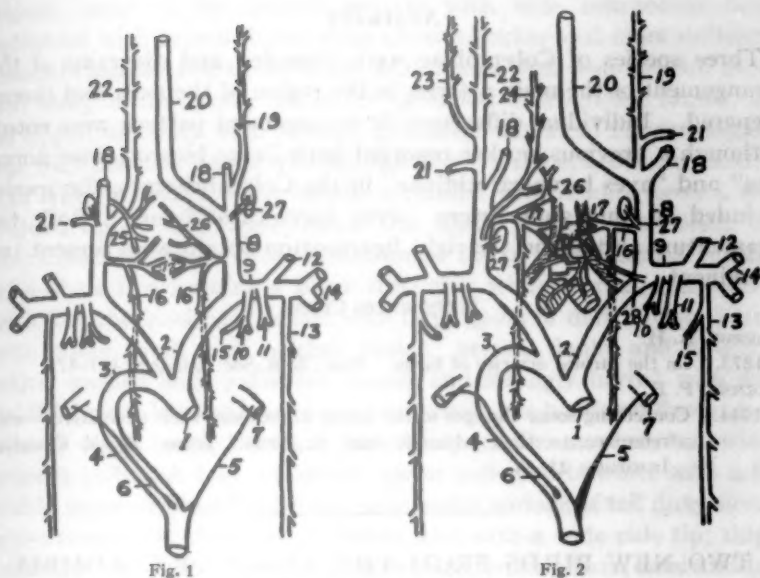
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divides to form the innominate arteries (2); the right systemic (4th aortic) arch arises from the right innominate just after its origin. The innominates then divide to give rise to the common carotid (8) and subclavian (9) arteries. The subclavian then gives rise to the coracoid minor (10), coracoid major (11), axillary (12), intercostal (13), and two pectoral (14) arteries in order. The common carotids give rise to the ductus shawi (16), vertebral (18), superficial cervical (19 and 23) and internal carotid (20 and 22) arteries. The right internal carotid artery (22) becomes functionally modified to serve as the primary ascending-oesophageal artery, while the left internal carotid (trunk) artery (20) alone enters the hypapophysial canal (Glenny, 1944). Both the ligamentum aortae (5) and the right ligamentum botalli (6) are present and prominent—maintaining both proximal and distal attachments. The thyroid arteries (27) arise variously from the common carotids or one of the cervical branches. Beyond the above basic arrangement, specific and presumably individual variations occur.

Colymbus auritus (Text-figure 1): The sterno-tracheal artery (15) arises as a branch of the coracoid minor (10); the ductus shawi gives rise to syringo-tracheal branches (17) and a basi-oesophageal branch (26); the right vertebral artery (18) gives rise to a small basi-oesophageal artery (25); the thyroid artery (27) arises near the base of the vertebral and internal carotid arteries; a scapular artery (21) arises near the base of the right vertebral artery. While no left scapular vessel was observed, one may be found arising from the left superficial cervical (19). A right superficial cervical (23) was not observed although it may be present in other specimens as a reduced vessel. The ascending-oesophageal artery (22) also serves as a superficial cervical artery.

Colymbus grisegena holböllii (Text-figure 2): The sterno-tracheal artery (15) arises as a branch of the intercostal artery (13); a bronchi-tracheal artery (28) arises from the left subclavian artery before the origin of the coracoid minor (10); the ductus shawi gives off syringo-tracheal branches (17) and a basi-oesophageal branch (26) arises from the right ductus shawi; a meso-oesophageal artery (24) arises from the common carotid; both left and right scapular arteries (21) are present; the right superficial cervical artery (23) arises as a branch of the ascending-oesophageal artery (22) which also sends branches to other tissues of the neck.

Podilymbus podiceps: The arrangement is similar to that of *Colymbus grisegena holböllii*. An accessory ascending-oesophageal artery arises from the left common carotid at the base of the left superficial cervical



KEY TO TEXT-FIGURES

MAIN ARTERIES IN THE NECK AND THORAX OF: Figure 1.—*Colymbus auritus* ventral view. Figure 2.—*Colymbus grisegena holboellii* ventral view.

1, aortic root; 2, innominate arteries; 3, right systemic arch; 4, right radix aortae; 5, ligamentum aortae; 6, right ligamentum botalli; 7, pulmonary artery; 8, common carotid artery; 9, subclavian artery; 10, coracoid minor artery; 11, coracoid major artery; 12, axillary artery; 13, intercostal artery; 14, pectoral arteries; 15, sterno-tracheal artery; 16, ductus shawi; 17, syngo-tracheal artery; 18, vertebral artery; 19, left superficial cervical artery; 20, left internal carotid (trunk) artery; 21, scapular artery; 22, right superficial cervical/ascending-oesophageal artery; 23, right (accessory) superficial cervical artery; 24, meso-oesophageal artery; 25, basi-oesophageal artery; 26, basi-oesophageal artery; 27, thyroid artery; 28, bronchi-tracheal artery.

artery (19) and passes diagonally to the right until it comes to lie alongside the oesophagus and then passes anteriorly.

DISCUSSION

It would appear that there are two arrangements of internal carotid (trunk) arteries in the Colymbidae. It appears, however, that there is a tendency for the condition indicated by the term "aves laeво-carotidinae" to predominate in this family. It is obvious that more complete studies must be made in the future to determine the essential differences (as well as family characteristics) of the two groups illustrated by Garrod (1873).

It is probable that many individual or specific variations may be found among members of this order of birds.

ABSTRACT

Three species of Colymbidae were dissected and diagrams of the arrangement of the main arteries in the region of the neck and thorax prepared. Individual differences in arrangement-pattern were noted. Although a previous worker reported both "aves bicarotidinae normales" and "aves laevo-carotidinae" in the Colymbiformes, the species included in this study were "aves laevo-carotidinae." Both the ligamentum aortae and the right ligamentum botalli were present and prominent.

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TWO NEW BIRDS FROM THE ANDES OF COLOMBIA

BY F. C. LEHMANN V.

***Bubo virginianus colombianus*, subsp. nov.**

CHARACTERS.—Similar to *Bubo virginianus nigrescens* Berlepsch, from Ecuador, but with color pattern between this and *Bubo virginianus elutus* Todd, of the arid Caribbean coast of northern Colombia; facial disc paler than in *nigrescens* or *elutus*; upper parts rufous brown, paler than in *nigrescens*, but more uniformly colored than in *elutus*; barring on breast and abdomen different, with the bars broader and less in number.

TYPE.—Adult male from Peñablanca, western side of the Central Andes, east of Popayán, Colombia; elevation 2,900 meters. Collection of the Museo de Historia Natural, Universidad del Cauca, Popayán, Colombia, collected by F. C. Lehmann V., August 10, 1938.

DESCRIPTION.—Forehead and crown dark brown, densely spotted with yellowish white and buff on the forehead, and with yellowish buff at the base of the ear-tufts and on the hind neck; ear-tufts brownish black, with a narrow yellowish white margin on the inner side, this pale margin not reaching the tips of the feathers; hind neck, scapulars, greater wing-coverts, and rest of upper parts rufous brown, paler than the crown and lesser wing-coverts, spotted with yellowish white and buff; scapulars and greater and middle wing-coverts with conspicuous square-shaped white spots on their external webs, giving a spotted

aspect; some of the middle coverts with wide ochraceous bands sprinkled with brown; lesser wing-coverts darker and more uniformly colored than the rest of the wing; secondaries with wide reddish brown and buffy white bands, the latter sprinkled with reddish brown, and all tipped narrowly with whitish; primaries similar to the secondaries, but with the pale bands whitish; tail above reddish brown, crossed by four wide yellowish white bands, sprinkled with reddish brown, with whitish tip 14 mm. wide; facial disc white, washed with black and ochraceous below the eyes, whiter under the bill, the external feathers with black tips forming a black ruff; chin white; throat and sides of neck like the hind neck; chest with large spots of dark brown, barred with white, buff, and reddish brown; breast, flanks and abdomen white, washed with yellowish cream, and strongly barred with dark reddish brown bars which are lined with buff, the barring different from that in other races, the dark bars being less in number, but wider; crissum yellowish buff, unbarred; under tail-coverts white with a few widely separated reddish brown bars; under surface of tail dirty silvery white crossed by three brown bands, and with a wide pale tip; thighs yellowish buff dotted with reddish brown, forming bars; tarsi and toes well feathered, yellowish white, unmarked on the lower portion, but washed with light ochraceous on the hind toe, where dotted with reddish brown, less densely than the thighs, but forming bars. Bill horn black; cere lead color; claws black; eyes pale orange yellow. Wing, 355 mm.; tail, 216; culmen (without cere), 32; ear-tufts, 56.

RANGE.—This race of owl inhabits the Páramos and the Temperate Zone forests near the tree-line in the highest parts of the Central Andes in Colombia, from the Valle de las Papas in the south, at least to the Nevado del Tolima in the north, at elevations of 2,800 to 4,000 meters above sea level.

SPECIMENS EXAMINED.—

B. v. colombianus: 1 ♂ ad. (the type); 1 ♀ ad. collected by F. C. Lehmann V, at the type locality May 13, 1937.

B. v. nigrescens: 1 ♂ imm., collection Colegio Militar, Quito, Ecuador, taken March, 1939; 1 ♀ ad., Santo Domingo de los Colorados, collected by Teodomiro Mena; 1 ♀ ad. without exact locality, Ecuador; 1 ♀ ad., Ecuador (these three specimens in the collection of Colegio Mejía, Quito); 1 ♂, 1 ♀ (??) adults, collection Colegio Bolívar, Ambato, Ecuador (without exact locality).

B. v. elutus: 2 ♀ ♀ adult, 1 ♂ juv., collection Lehmann, taken on the Río Ranchería, Ríohacha, Colombia, between April 8 and 10, 1941.

MEASUREMENTS.—

B. v. elutus:

♂, wing 353; tail 214 mm.

♀ ad., wing 370; tail 212 mm.

B. v. colombianus:

♂ ad., wing 355; tail 216; culmen (without cere) 32; ear-tufts 56 mm.

♀ ad., wing 370; tail 217; ear-tufts 60 mm.

B. v. nigrescens:

♂ wing 365; tail 210; ear-tufts 65 mm.

♀ wing 355–382; tail 215–217; culmen (without cere) 33–35; ear-tufts 65 mm.

REMARKS.—As will be seen from the description, this new race of *Bubo virginianus* is nearer to *nigrescens* than to *elutus*. It is also nearer to the northern races in the color pattern of the upper parts, the narrow, close barring of the under parts and the reddish facial disc. The coloring of the upper parts in old individuals, however, is less broken than in the northern races, approaching in this respect *B. v. nigrescens*.

In an earlier note in *Caldasia*, 2 (No. 9): 410, 415, 1944, I referred two specimens of this owl to the Ecuadorian form for lack of topotypical specimens for comparison. Later, during a visit to Ecuador, I was able to see several specimens of *nigrescens* that are supposed to be topotypical, and so noted the difference. Mr. K. von Sneider has informed me of the presence of this owl in Nevado del Tolima, where he saw it on the páramos perching on the stumps of dead frailejones (*Espeletia*) where they were difficult to see. He observed that they were preying upon rabbits. Seemingly this is a favored food with this owl as with its northern cousins, and I noted the same food preference in the great horned owls taken by me on the Río Ranchería mentioned above.

They probably also take the big snipe (*Capella nobilis*), or the solitary snipe (*Chubbia jamesoni*). In the Temperate Zone rain forests they can easily procure small mammals such as squirrels, and possibly birds. This owl hunts by day; the one selected as type I met with at noon when it was eating a black coati (*Nasua olivacea*) that it had killed.

Strange to say, among the specimens of *B. virginianus nigrescens* that I examined in Ecuador, which is supposed to be a race inhabiting only the higher mountains of western Ecuador, I saw an adult female taken by Teodomiro Mena in Santo Domingo de los Colorados in the Pacific drainage at an altitude of only 500 meters above sea level.

I was unable to detect any difference between this bird which is in the collection of Colegio Mejía, and another taken at the tram station in Quito, where it had struck an electric rod and so was killed. In the note in *Caldasia* referred to above, on p. 416, I have recorded the report of a *Bubo* on the Anchicayá River, Dept. Valle, Colombia, at a place called Monos, at an elevation of 300 to 400 meters above sea level. This bird I was unable to find though I made careful search for it.

Rodolphe Meyer de Schauensee (Proc. Acad. Nat. Sci. Philadelphia, 97: 2, 1945), reports a female *nigrescens* taken by K. von Sneidern on Volcán de Chiles, Nariño, Colombia, at an elevation of 11,000 ft., that is now in the Academy's collection.

It is probable that another race, possibly *B. virginianus scotinus* Oberholser, is found in eastern Colombia. During a recent trip to the Llanos east of San Martín, not far from the Río Umadea, I was informed that during the dry season considerable numbers of eared owls, which the natives call "*Buturucu*" (pronounced boo-too-roo'-koo), come to nest in the moriche palms (*Mauritia*). The description of the bird and the vernacular name from the hooting call lead me to believe that this is a *Bubo*. I may add that this name sounds like the Brazilian *nacurutu* given to another race of this species. I am more inclined to believe that the Llanos bird mentioned is *scotinus* rather than *nacurutu* of Brazil, as the Venezuelan form is recorded from Caicara on the Orinoco. However, the Amazonian form may be found eventually in Colombian Amazonia.

Oxyura jamaicensis andina, subsp. nov.

CHARACTERS.—Similar to *Oxyura j. jamaicensis* (Gmelin) but smaller; also smaller than *Oxyura ferruginea* (Eyton) of extreme southern Colombia, Ecuador, Perú and Bolivia, differing from this last species in having the sides of face white as in *jamaicensis*, and being paler below.

TYPE.—Adult male from Lagunas del Páramo de Boca-Grande, north of Nevado de Sumapaz, Cundinamarca, Eastern Andes of Colombia; elevation 4,000 meters. No. 113 in the collection of the Instituto de Ciencias Naturales, Universidad Nacional, Bogotá, collected by F. C. Lehmann V. September 14, 1942.

DESCRIPTION.—Forehead, crown, sides of head to below the eye, and nape black; lores, sides of head, including post-auricular region, a narrow line at the base of bill and across the chin white; upper throat black with white margins to the feathers; throat and neck all around, upper parts, breast, flanks, upper tail-coverts and thighs bright glossy chestnut or kaiser brown; rest of lower parts silvery white, washed

with buffy, basal half of the feathers burnt umber, giving a broken, barred appearance; under side of tail, and under wing-coverts white; wing-coverts, primaries, and tail blackish brown; bill pale bluish gray; tarsus and webs greenish blue gray; toes washed with dusky. Wing, 149 mm.; tail, 78; culmen, 46; tarsus, 31; width of bill at base, 18.5; greatest width, 29.

RANGE.—Andean lakes of the Central and Eastern Cordilleras in Colombia, from the Puracé region, Dept. of Cauca, to Laguna de Fúquene, Cundinamarca and Boyacá.

MATERIAL EXAMINED.—♂ ad., Laguna de Tota, Boyacá, Colombia, altitude 3,070 meters, collected by J. I. Borrero, August 27, 1945. In this specimen, which is not fully adult, the throat has the same color as the upper parts, but the chest is much darker burnt umber, with the rest of the under parts washed with light ochraceous buff; the under tail-coverts washed with apricot buff; white sides of head sprinkled with black dots below the eyes. The wings are paler than in the type. Wing 139 mm.; tail 76; culmen 48; tarsus 29; broader part of bill 25.

♀ ad., No. 237 B, same data as the preceding. Forehead and crown blackish brown finely spotted with reddish; neck all around grayish brown, with fine reddish margins to the feathers; chin and throat paler reddish buff, slightly darker below the eyes; lores similar to crown; upper parts grayish brown spotted with chestnut red; chest strongly spotted with dark ferruginous, the feathers at base dusky black; abdomen paler; under tail-coverts white; wings as in the male; bill dusky brown; feet dusky. Wing 122 mm.; tail 44; culmen 44.5; tarsus 28.

♂ ad., in the collection of the Museo de Historia Natural, Universidad del Cauca, Popayán, Colombia, collected by K. von Sneider at Laguna de San Rafael, Páramo of Puracé, Central Andes, altitude 3400 meters. This specimen has the white area of the face not fully developed but in other aspects is similar to the type.

Duckling, unsexed, collected by Lehmann at Laguna de Fúquene, Boyacá, Eastern Andes, February 3, 1939, altitude 2,500 meters. Forehead light brown; crown dark brown; sides of head brownish gray; chin yellowish white; upper parts dusky with two conspicuous spots at the sides of the back and on wing tips; shafts of tail feathers with only a few soft barbs; under parts whitish gray; base of lower mandible yellow; maxilla dusky; feet dusky.

A younger duckling, collected by Borrero at Laguna de Tota, August 27, 1945, is slate black on the forehead, crown and upper parts, with a line of this color extending backwards on nape and neck; chin,

sides of face and sides of neck whitish, washed with grayish brown; throat and chest light brown; breast and abdomen whitish; the two white spots of sides of back well developed.

REMARKS.—This is a common bird in the cool waters of the lakes and lagoons of the páramos of the Central and Eastern Andes, and during winter it comes to the Savanna of Bogotá, at altitudes varying from 2500 to 4000 meters.

Ducklings have been taken February 3, 1939, at Fúquene; September 14, 1942, at Boca-Grande, Eastern Andes; and August 27, 1945, at Tota. At Laguna San Rafael Lake, Puracé, Cauca, I have taken ducklings at several other dates.

In Caldasia, 9: 408, 1944, I have referred Colombian specimens of this duck to the southern race *ferruginea*, but later study of specimens of *ferruginea* leads me to describe the Colombian Ruddy Duck as a new race of *jamaicensis* on account of its white face and paler under parts. *Oxyura ferruginea* (Eyton) has been taken at Cumbal, Nariño, Colombia, by von Sneider. (*See Caldasia, loc. cit.*).

I wish to express my gratitude to Professor Gustavo Orcés V. of Quito, for his kind advice and help extended to me during my recent visit to that country, and also to Dr. Alexander Wetmore, of Washington, who has read this account in manuscript and also has examined the proofs.

Carrera 3a. N° 1-83
Popayán, Cauca
Colombia, S. A.

ORNITHOLOGICAL RESULTS OF THE BAFFIN ISLAND EXPEDITIONS OF 1928-1929 AND 1930-1931, TOGETHER WITH MORE RECENT RECORDS

(Continued from Page 24)

BY J. DEWEY SOPER

20. *Buteo lagopus s.johannis* (Gmelin), AMERICAN ROUGH-LEGGED HAWK. Eskimo: *Kin'wā"yoūauk'*.—Breeds sparingly along the south coast from at least Lake Harbour to Foxe Channel. At present it is not known to occur elsewhere on the island. None was seen on the 1928-1929 expedition to southwest Baffin Island. At Lake Harbour it was first noted on June 2, 1931; thereafter, individuals were observed in the district on four occasions up to early July—in one instance about fifteen miles up Soper River. The bird is far from common, but the Eskimos assert that it breeds there regularly in small numbers. Shortt (1942: 342) observed examples at Lake Harbour during the Eastern Arctic Patrol in 1938.

21. *Falco rusticolus obsoletus* Gmelin, BLACK GYRFALCON. Eskimo: *Këgûy''-ik'*.—White Gyrfalcons were noted at wide intervals in Foxe Peninsula from August until late October, 1928. None was seen during the winter until February 25, when a solitary bird appeared at Dorset Harbour. Another circled the locality a few days later. It was not again seen until May 14, when a pair flew northward over Cape Dorset. At Camp Kungovik two were noted in late May, and one on June 1, which were the only ones observed here or elsewhere during the summer. They are also scarce in the Lake Harbour region. A single individual was seen on August 6, 1930—the only one for the season. Three were observed in company flying south over Lake Harbour on January 14, 1931; the species was not again detected in the district that year. The Eskimos state that it nests sparingly throughout the country.

A very dark raptor was seen by the writer along White Strait in early September 1930, which was thought to have been this subspecies. It was evidently a dark gyrfalcon that Bailey collected at Lake Harbour on August 11, 1930, and a black adult was seen by Peters a few miles inland from this point on August 15, 1939 (Shortt and Peters, 1942: 342).

22. *Falco peregrinus anatum* Bonaparte, DUCK HAWK. Eskimo: *Kik'këvëok''-jûk'*.—The rarity of this falcon in Foxe Peninsula is well demonstrated by the fact that only three adult individuals were observed by the writer during the entire expedition of 1928–1929. A pair was seen with three well-fledged young on a cliff at Schooner Harbour, August 17, 1928, and the last example on September 24, at Kingungealuk Lake, north of Andrew Gordon Bay. Occasional individuals were observed at Lake Harbour throughout August and September 1930, after which it was absent for the winter. It was next noted here on May 30, 1931, followed by four others in early June, but was not again seen during the summer. The species nests sparingly throughout the region.

*23. *Lagopus lagopus leucopterus* Taverner, WHITE-SHAFTED PTARMIGAN. Eskimo: *Arkdgë''vik'*.—For details regarding this new subspecies, see Taverner (1932). The writer first encountered these birds in Baffin Island at Ungenuk Lake, Foxe Peninsula, on April 12, 1929. These were apparently early migrants to the island, as none had been observed anywhere earlier in the winter. The next were seen on May 23 when hundreds were met with on the lowlands approaching Bowman Bay. As the party travelled northward they were found in large numbers. At Camp Kungovik (type locality) the astonishing abundance of these birds was maintained until nearly the middle of June. After this they became widely dispersed and relatively few were seen. While we were crossing the peninsula from Foxe Basin to Hudson Strait, a pair was observed at Crystal Lake on August 16, with six juveniles just able to fly—the first definite breeding record for the island. A comparatively large series of specimens was collected during the spring and summer.

During the expedition of 1930–1931, these birds were not seen in the Lake Harbour district. The Eskimos, however, report occasional *Arkagevik* during migration; they know nothing of its breeding, except that one hunter a few years ago is said to have taken several young near White Strait. In view of the scarcity of these ptarmigan along the south and east coasts, and the apparent lack of pronounced migration anywhere along Hudson Strait, it is believed that most of the birds cross directly from Southampton Island to central and northern Foxe Peninsula to Bowman Bay, and north to Taverner Bay (see Bray and Manning, 1943: 516). As the Baffin Island situation appears at present, *leucopterus* is almost wholly a bird of the western lowlands, whereas *rupestris* is distributed in the rocky hill and mountain masses, with greatest abundance to the south and east.

24. *Lagopus mutus rupestris* (Gmelin), ROCK PTARMIGAN. Eskimo: *Ark'-dgi'k'*.—This is one of the most characteristic land birds of southern Baffin Island. It is certain to be encountered by the explorer almost anywhere along the coasts and in the interior the year round, but in much smaller numbers during the winter. Though it is not especially abundant in the Cape Dorset region, except during the spring migration, it nests with fair frequency in suitable localities. In 1928, a female with young was seen near Dorset Harbour on August 3. Throughout the late summer and autumn it was noted regularly over the country at large, both along the mountainous coasts and on low ridges in the interior. In late September, the species was especially numerous at Tessikjuak Lake and along Moukjunil River, frequently appearing in flocks of eighteen to twenty individuals.

Relatively few were met with during the winter. They were generally distributed, however, and individuals were noted from time to time, in late March, over rocky terrain as far north as Hantzsch River. The race becomes more common again in April and early May. At Camp Kungovik it was fairly numerous on isolated ridges by May 24 and continued tolerably common throughout the summer. On June 18, a female was collected with a fully formed egg in the oviduct, and on the 28th a nest was found containing ten fresh eggs. The birds were fairly common in early August all along the south coast of Foxe Basin and across Foxe Peninsula interior from Kommanik River to Andrew Gordon Bay; adults were several times seen accompanied by immatures well grown and in flight.

White and native residents in the Lake Harbour district state that in some years Rock Ptarmigan arrive in great numbers during migration. It appears that this was the case in the spring of 1928. There is sometimes also a very striking migrational wave during the autumn. No such marked migration occurred during 1930-1931; in fact, ptarmigan were phenomenally scarce throughout the summer and fall of 1930. The following spring an insignificant movement was noted between May 5 and 20, but not a single example was personally recorded in the Lake Harbour district after May 22. Very large flocks congregate at Cape Chidley, Labrador, in the spring and fall, which ostensibly migrate to and from Baffin Island (Hantzsch, Jan., 1929: 15).

Taverner (1929: 28-38) after critical examination of southern Baffin Island material, refers the dominant form to *rupestris*. It is to be noted in this connection that occasional specimens of the more northern and western race, *kelloggae*, were taken at Nettilling Lake during the early half of June, 1925, which were probably migrants. The regular breeding form is unquestionably *rupestris*, whereas it is assumed that *kelloggae* is to be expected in southern Baffin Island in migration in winter, or as accidentals at any season.

25. *Grus canadensis* (Linnaeus), LITTLE BROWN CRANE. Eskimo: *Tul'eguk'*.—This bird was never observed by the writer on Baffin Island. There is no evidence that it occurs in the southwestern part of the territory. On the other hand, the Lake Harbour Eskimos state that the species was at one time more or less regularly observed migrating through this district to the northward. Of late years it has become much rarer if not practically absent, for it was not ascertained with certainty that the bird has been seen here recently by anyone. A power boat at Lake Harbour, managed by natives, bears the Eskimo name of this species, which is certainly significant of its occasional occurrence at least. Records exist for more northern Baffin Island localities.

*26. *Crex crex* (Linnaeus), CORN CRANE.—On September 24, 1928, a male was collected on a sandy beach at Dorset Harbour, with the beginning of early winter

conditions. This was a solitary bird, very thin and barely capable of faltering flight for short distances. This is the first record for Baffin Island or the Canadian Arctic regions. The specimen, when passed around, was not known to any of the Cape Dorset Eskimos.

27. *Vanellus vanellus* (Linnaeus), LAMPWING.—An adult male specimen of this Old World species was collected by Mr. F. E. Heath, Hudson's Bay Company, at Pangnirtung Fiord, Cumberland Sound, in October, 1926. With other specimens it was forwarded by Cpl. H. P. Friel, Royal Canadian Mounted Police, to the National Museum of Canada, Ottawa, where it was received on September 16, 1927. When shot, the stomach contents of the individual in question consisted entirely of shrimps. In 1927 an extraordinary flight of these birds took place to the shores of Newfoundland where they were evidently blown by a strong gale from the east. In view of this occurrence and the existing specimen, noted above, it is highly probable that many birds reached the Labrador and Baffin Island coasts which were not observed and recorded.

28. *Charadrius hiaticula semipalmatus* Bonaparte, SEMIPALMATED PLOVER. Eskimo: *Kūd'lekhōd'leōk'*.—This species is widely distributed and nests almost everywhere throughout the region in suitable coastal and inland localities as far north as Cumberland Sound. It is the common plover of southern Baffin Island. In southwestern localities it is a familiar summer resident. During August, 1928, it was observed almost everywhere along the Foxe Channel coast to Cape Dorchester. The species was most numerous at Nuwata between August 20 and 23, where it is said by the Eskimos to nest freely. An obvious decrease in numbers was noted here on August 26. Several were seen two days later between Cape Enauolik and Cape Queen, which were the last individuals noted for the year.

In 1929, the species first appeared at Camp Kungovik on June 9. Until June 22, it lingered in fair numbers in the locality, after which solitary breeding pairs were observed only at wide intervals during the summer. It was sparingly observed in early August along the north coast of Foxe Peninsula, but was nowhere noted while we were crossing the interior from Foxe Basin to Hudson Strait.

The species is a tolerably common summer resident in the Lake Harbour region, where it breeds about the small lakes on sandy spits and benches common to such situations. In the spring of 1931, considerable numbers were in evidence during the time of migration. The first birds appeared on June 5, already mated, after which, for a week, the birds became more numerous; numbers then rapidly dwindled until only the comparatively few local breeders remained. Though by no means abundant, mated birds are encountered with fair frequency throughout the country. Several breeding pairs are commonly observed about one small lake where ideal, sandy beaches exist. The species was noted at intervals in late June and early July, far into the interior along Soper River.

29. *Pluvialis dominica dominica* (Müller), AMERICAN GOLDEN PLOVER. Eskimo: *Kēd'ūl*.—This is a rare bird along the southern and eastern coasts of Baffin Island, but occurs in some numbers on the western side. Its migration to and from the island is almost certainly by way of Hudson Bay. The species was nowhere seen by the writer in the southern part of Foxe Peninsula. In late August, 1928, however, it was frequently noted at Nuwata and at capes Weston and Dorchester. None was encountered after leaving Nuwata for Cape Dorset on August 27.

In the spring of 1929, the first migrants of the season were observed at Camp Kungovik on June 5. Until June 19, examples were daily observed in varying

numbers (most common, however, during the second week of June), when they completely withdrew from the locality. A solitary individual was noted at Cape Alberta on July 29—the last record of the season. The species is of questionable occurrence as a migrant at Lake Harbour. Not observed by the writer during the expedition of 1930–1931.

30. *Squatarola squatarola* (Linnaeus), BLACK-BELLIED PLOVER. Eskimo: *Tūd'ūng*.—On the 1928–1929 expedition this plover was first observed at Camp Kungovik on June 3, 1929. Thereafter the birds rapidly increased in numbers and appeared in flocks of twenty to forty individuals, as they fed on snow-free strips of tundra along Blue Goose River. From June 6 to 18, it was one of the most characteristic birds of the region, as it was also the wariest. After the latter date, the majority passed on to the north, but fair numbers remained to breed on the lowlands bordering Bowman Bay.

The first nest, with three fresh eggs, was taken on June 25. The nest was situated on a dry granite ridge—a simple depression in the ground lined with fragments of white reindeer moss. Another with two fresh eggs was found on July 2. After we left the grass tundra on July 24, the species was commonly observed all along the south coast of Bowman Bay, at Cape Alberta from July 26 to August 5, on the lowlands bordering the south coast of Foxe Basin, and up Kommanik River as far as Crystal Lake. Like several other species, it appears to be confined to the northern lowlands during the summer, as none I noted was in the southern part of the interior while en route to Hudson Strait. *Squatarola* was not personally seen on the expedition of 1930–1931 to the southeastern part of the island. The Eskimos claim that a few stragglers sometimes occur; there is no evidence of its nesting.

*31. *Arenaria interpres morinella* (Linnaeus), RUDDY TURNSTONE. Eskimo: *Ānūk'ūū*.—Earlier investigations indicated that this species was very rare on Baffin Island, but up to that time only the eastern side had been carefully scrutinized. In the present territory it was first seen by the writer at Nuwata, Foxe Channel, August 20, 1928. In the course of the next two days several individuals were noted feeding on the low-tide mud flats in the same locality, and on August 23 a pair was seen at the edge of the surf near the extremity of Cape Weston. The species was next observed on June 6, 1929, when a flock of ten spring migrants appeared at Camp Kungovik. It was common thereafter until June 20, when it suddenly became much scarcer, though a few scattered pairs remained to breed in the vicinity. A nest was found on July 3, containing four fresh eggs; this constitutes the first Baffin Island breeding record. Along Blue Goose River in mid-July, the species was fairly numerous as far as this stream was ascended to the northeast. It was also tolerably common in early August, from Bowman Bay to Cape Ketoria, which would indicate breeding grounds all along this part of northern Foxe Peninsula.

The Eskimos say that the species occurs in small numbers along the outer coast-lines of the Lake Harbour district during migration. It was not seen there by the writer. This is quite in harmony with its previously ascertained scarcity in other parts of eastern Baffin Island.

32. *Calidris canutus rufus* (Wilson), AMERICAN KNOT.—Evidently a rare visitor to Baffin Island. The writer failed to detect it until the spring migration of 1929, at Camp Kungovik, Bowman Bay. An uncertain entry was first made on June 10 from an unfavorable sight record, but one individual was positively identified with the glasses on the evening of June 14. The following morning a male was collected

(No. 2120), which was associating with a large mixed flock of White-rumped and Purple Sandpipers on a narrow, snow-free strip of grassy tundra. No others were observed. The bird had not previously been seen by the southwestern Eskimos, so a native name for the species is lacking. It is not known to occur in the Lake Harbour region.

33. *Erolia maritima* (Brünnich), PURPLE SANDPIPER. Eskimo: *Sëgäl'ëäh'*.—Scarce at Cape Dorset during the spring migration, but appears in large numbers there from the middle of September until about October 8. A few stragglers remain along the rocky coasts until the last week of October. In 1928 the birds were exceptionally numerous on August 20 at Nuwata, where they were constantly to be seen feeding or wheeling about over the beaches and tidal flats. Numerous individuals and small flocks were noted at various points northward to Cape Dorchester. During late September and the first week of October many migrating groups were seen from Andrew Gordon Bay to Cape Dorset.

The species was next noted at Camp Kungovik where the first small flock appeared on June 3. Numbers of individuals kept increasing daily until they were abundant by June 11. At this time only very small strips and patches of tundra bordering Blue Goose River were free of snow, and here the earliest arriving birds were forced to feed in mixed companies of several species. It was a common sight to see large numbers of this species, Snow Buntings, Lapland Longspurs, White-rumped and Baird's Sandpipers, Golden and Black-bellied Plovers, Snow, Blue, and Canada Geese, and American Brant, all crowded together sociably on a single, narrow strip of muddy tundra along the ice-bound river. During the height of the migration the locality was a veritable naturalist's paradise.

The full tide of the Purple Sandpiper migration was reached by June 15, and for the next five days the birds occupied the region in great abundance. Every small, bare patch of tundra in the country supported numbers of these waders and, in aggregate, on the larger snow-free areas, they swarmed in thousands. Normally the birds are quite indifferent to approach and in disposition are dull and unsuspicious.

The species maintained its maximum abundance in the vicinity of Camp Kungovik until June 21, with an appreciable diminution in numbers the following day, and on the morning of June 23 not a single Purple Sandpiper was to be seen; as by a pre-arranged signal the species utterly vanished from the plain during the previous night. On July 2, however, a solitary example was seen near Bowman Bay, and on July 12 a pair was noted twelve miles northeast of camp along Blue Goose River. Both of these occurrences came as a marked surprise. Probably a few scattered individuals remain to nest in this locality. In late July and early August many small flocks, pairs, and solitary birds were observed from Cape Alberta to Kommanik River. Judging from the actions of some of these, it is believed that *maritima* nests sparingly along this coast, though no young were detected.

In September, 1930, a few small companies were seen along the coast near Lake Harbour. It is apparently not very common here and the Eskimos assert that it never nests in the district. Of interest, however, is the statement by the writer's one-time Eskimo assistant, Moosa, that one summer, while caribou hunting, he saw nests and eggs of this sandpiper in moist, grassy depressions about lakes far inland, northwest of Crooks Inlet. In 1931, the first migrants of the species were observed on the outer Lake Harbour coast on May 24; it was sparingly noted in the district until June 2.

34. *Erolia melanotos* (Vieillot), PECTORAL SANDPIPER.—One of these sandpipers was collected by Manning (Bray and Manning, 1943: 522) at Taverner Bay, west coast of Baffin Island, on August 20, 1939. It constitutes a new record for the island. The specimen was deposited in the National Museum of Canada, Ottawa.

35. *Erolia fuscicollis* (Vieillot), WHITE-RUMPED SANDPIPER. Eskimo: *Lévelliv'*.—Very few of these little sandpipers resort to the south coast of Foxe Peninsula during the summer, though they are known to breed very sparingly in favorable localities. A few occur in the spring migration, but the species is very scarce in the autumn. The situation, however, is radically different in the northern part of the peninsula, where they gather in large numbers. Along the south and east coasts of Foxe Basin, and about Nettilling Lake, they are the most plentiful breeders among the Limicolae of the region.

In 1928, four were observed at Cape Enaulik on August 19, and the following day the species was common at Nuwata. At Cape Weston the birds were sparingly observed on August 23 and 24, but two days later became abundant there and at Cape Dorchester. Numerous flocks were met with on August 26 to 28 at Nuwata, where they fed in swarms on the tidal flats or dashed vivaciously up and down the coast in flocks of fifty to one hundred individuals. Rare, small groups were observed along the south coast, east to Andrew Gordon Bay, up to September 28.

In the spring of 1929, the species first appeared at Camp Kungovik on June 4, in company with Baird's and Purple Sandpipers. Thereafter the birds rapidly increased in numbers until myriads were feeding in, and migrating through, the locality. Like the Purple Sandpipers, they invaded the region in almost incredible numbers and swarmed over every available patch of tundra, only lately cleared of snow. This intense wave of migration persisted from June 8 to 14, after which their numbers gradually diminished, but a large resident population remained to nest on the surrounding tundra. Males appeared to precede the other sex by a week as, with daily collecting, the first females were secured on June 11.

The peculiar flight song of the male was first heard on June 9 and was generally prevalent by June 14. The effort is much thinner and weaker than that of *Ereunetes pusillus*, and is to be heard in all its details only at very short range. It is given both from the ground and in direct or hovering flight, but more commonly on the wing. It is not melodious—rather a thin, guttural and gurgling effect somewhat resembling the syllables *zip-it, zip-it, zip-it, zip-it* rendered with considerable rapidity. While it is being uttered the mandibles are separated to their fullest extent; the effect is produced entirely in the throat. Another rendition resembles *u-zip, u-zip, u-zip, u-zip, u-zip*, etc., with the notes strangely interwoven and producing a singular, grating intonation. At very close range a low, droning undertone can be detected like the humming of a miniature motor. If one is quite near the performer, it may be noted that the song begins with a low, almost inaudible humming before the actual notes commence. During flight the song is frequently rendered as the bird, with wings held stiffly erect and motionless, descends slowly to the tundra from a height of thirty or forty feet.

The first nest of the species, with a single egg, was found on June 22, and the first with a full set of four fresh eggs on June 28. This indicated a considerably later date for egg laying than in 1925 at Nettilling Lake, where a full set of fresh eggs was found on June 16. Fresh sets of eggs were collected as late as July 1; several others taken during the first week of July were slightly incubated. In the general region of Camp Kungovik, nests were invariably placed on low, grassy tussocks or flattened mounds

on the tundra, where often they were encircled by water. The structure is a neat and comparatively shallow depression in soil and moss, lined and overhung by grasses. In this region there was always an additional bottom lining of the small, dead leaves of *Salix reticulata*.

With this species there is a conspicuous tendency to flock with Red Phalaropes. The trait was observed at Nuwata the previous fall, as well as on the tundra about Camp Kungovik and along the south coast of Bowman Bay in late July, 1929, where they were congregated in large numbers. The White-rump was commonly observed with young at Cape Alberta in early August. The species was not so numerous along the south coast of Foxe Basin, nor in the vicinity of Kommanik River and lakes en route to Hudson Strait, though a few individuals were observed almost daily as far south as Kingungealuk Lake.

It is said by the natives to migrate sparingly through the Lake Harbour district, though there is apparently no definite or well-defined movement. The birds observed are evidently only stragglers from the main stream of migration, which enters or leaves the island further west. The species was not observed by the writer in southeastern Baffin Island during the expedition of 1930-1931.

36. *Erolia bairdii* (Coues), BAIRD'S SANDPIPER. Eskimo: *Tuē'tuē'*.—In southern Baffin Island, Baird's Sandpiper is much less common than the preceding species. It was not observed anywhere by the writer during the summer and fall of 1928 along the coasts, nor in the interior of Foxe Peninsula, though according to the Eskimos it breeds sparingly in parts of this territory.

The first migrants of the season were observed at Camp Kungovik on June 4, 1929. The birds mingled amicably with White-rumped and Purple Sandpipers on the strips of bare tundra along Blue Goose River, but were much more restless and harder to approach than the last species. Numerous specimens were collected, however, in which males and females were about equally represented, which indicates that the sexes arrive together. The species was quite common here from June 4 to 7, after which it became scarcer and completely disappeared from the district by June 11. It was not again observed anywhere during the remainder of the season. It seems almost inconceivable that these birds do not breed in the Bowman Bay region, considering the apparently ideal nature of the ground, and the fact that they nest rather commonly at Nettilling Lake, a comparatively short distance away to the northeast.

This wader is reported by the Eskimos as a very rare migrant in the Lake Harbour region. Nothing was seen of it by the writer during the expedition of 1930-1931. There is a most conspicuous poverty of waders in southeastern and eastern Baffin Island, which is diametrically opposed to prevailing conditions in the western part. The main stream of the Limicolae migration enters the island much to the westward of Lake Harbour.

37. *Erolia alpina sakhalina* (Vieillot), RED-BACKED SANDPIPER.—The writer watched in vain for this bird during former seasons in Baffin Island. It was finally detected at Camp Kungovik, where a single bird was first collected on June 9, 1929. It appeared to be the only example in a mixed flock of about 80 White-rumped, Baird's and Purple Sandpipers. Another specimen was secured on June 17. *Sakhalina* is undoubtedly rare in Baffin Island, as the above were the only examples collected, or observed during the season; these specimens are the first ever taken on the island. So far as could be ascertained, the southwestern Eskimos had not previously noted this bird, in consequence of which no native name is available. Nothing was seen of the bird in the Lake Harbour region during the expedition of 1930-1931.

38. *Ereunetes pusillus* (Linnaeus), SEMIPALMATED SANDPIPER. Eskimo: *Livlilak'ullak'* (according to Hantzsch).—This little sandpiper was first observed on the 1928-1929 expedition on June 16 at Camp Kungovik, where it appeared in comparative abundance a few hours after the first individual was observed. The sexes arrive together, as among six specimens taken on June 16, they were equally represented. A few resorted to the open tundra, but the great majority, in the early days after their arrival, were met with in the broken uplands of the Eswituk Ridge. Here they fed in scattered formation on mossy and earthy areas and in the thawing mud about the borders of small pools.

Very shortly after their arrival the birds were heard delivering their aerial songs in much the same manner as that of White-rumped Sandpipers. The song is very rapidly executed as a high-pitched, melodious tremolo, resembling *re-a-re-a-re-a-re-a-re-a*, and is delivered with a force and volume surprising for a bird so small; it may easily be heard at a distance of 150 to 200 yards. The performance is given both in flight and on the ground, but the former is more common and characteristic. Another rendering is similar to the above but more softly blended in a rapid, wavering *re-e-e-e-e-e-e-e*.

The genuine love song of the species was first heard on June 25, as a bird flew on rapidly vibrating wings 200 feet above the plain; in a day or two it had become quite general. The syllables are similar to those already noted, but are merged with exceptional rapidity until the utterance becomes a soft, palpitating murmur. A single performance may last as long as 30 or 40 seconds, or even a minute. Slight pauses are observed between successive songs while the bird remains on rapidly beating wings over an almost identical spot, as though for the purpose of recovering its breath. After several minutes of this passionate delivery the performer suddenly descends with a rush to the ground. The species was last heard singing on July 8.

At Camp Kungovik it was numerous from June 16 to 21, after which it rapidly decreased in numbers, though the species remained fairly common on the lowlands throughout the summer. It is certain that it breeds commonly about Bowman Bay, though the most painstaking search by the whole party, on various occasions, failed to find a single nest. At Cape Alberta the species was noted daily from July 26 to August 5, but in much smaller numbers than in the neighborhood of Camp Kungovik. A few individuals were observed almost daily during the first and second weeks of August, while we were voyaging along the south coast of Foxe Basin and ascending Kommanik River to Ungmaluktuk Lake.

*39. *Phalaropus fulicarius* (Linnaeus), RED PHALAROPE. Eskimo: *Shok'gd*.—Surprisingly little was known about the Red Phalarope on Baffin Island previous to 1928. On the whole, the few specimens that were collected from time to time represent spring and fall migrants. Along the eastern part of the island, where the earlier observations were made, the species appears never to occur in any abundance; when good-sized flocks were encountered it was usually far out from the coasts during the month of July.

According to the writer's experience, the species is never common along the south or east coasts during either spring or fall migration, though small companies are occasionally met with during the third week of June. There are no breeding records, and the Eskimos appear to have no knowledge of its nesting in this immediate territory; nor does it seem to occur in summer, or as transients during the autumn. This is a particularly curious circumstance in view of the fact that it is now known to breed abundantly in northern Foxe Peninsula and on the tundra about Bowman Bay and northward.

In 1928, the first phalaropes were seen at Cape Enaulik on August 19. At Bird Islands, the following day, numerous small flocks were noted, and at Nuwata on August 21 and 22, several thousands were seen associating with White-rumped and Purple Sandpipers. From August 23 to 26, the species was only sparingly seen at capes Weston and Dorchester. Upon returning to Nuwata the next day, only a few scattered individuals of the great host previously met with, remained about the beaches. A few stragglers were seen as far south as the Trinity Islands on August 29, after which no others were observed for the remainder of the season.

The following spring, *fulicarius* first appeared at Camp Kungovik on June 9. By June 19, the birds had invaded the surrounding tundra in myriads. Maximum abundance persisted for six days, after which the majority disappeared, but large numbers remained to nest in the district. The first nest was found on June 27, with one egg; within 24 hours more than a dozen others were found, some with a single egg but most of them empty. During the first week of July sets of eggs were complete, and all those collected were nearly if not quite fresh. In a nest under daily observation near camp, the young hatched on July 16. The Bowman Bay sector is a prolific breeding ground of the species—probably one of the greatest in existence. Doubtless it extends over most of the western tundra from northern Foxe Peninsula to the limit of the grass tundra north of Koukdjuak River (Bray and Manning, 1943: 526) and eastward to Nettilling Lake.

In early August, Red Phalaropes were common at Cape Alberta and young were seen just able to fly. While we were voyaging along the coast westward to Kommanik River, many individuals were observed daily, but they were distinctly scarcer than to the eastward. During the ascent of Kommanik River on August 12, 13, and 14, the birds were observed in comparative abundance on the grassy river plains of the Foxe Basin slope, together with numerous immatures well awing. None, however, was noted to the south of Ungmaluktuk Lake on the southern watershed to Hudson Strait.

In the Lake Harbour region the species was not personally observed during the summer and fall of 1930. According to the Eskimos, it does not breed anywhere in this district and is never seen in the summer and only rarely during the autumn. It further appears, on native testimony, that it nests in grassy lake areas far to the northwest, probably on the flat tundra lands to the eastward of Amadjuak Lake; the information, however, is rather hazy. It was only once personally observed in the spring of 1931 when, on June 8, a single male was noted in a tidal pool bordering the edge of the land-barrier ice in McKellar Bay. In common with many other members of the Limicolae in this region, the Red Phalarope is very scarce.

40. *Lobipes lobatus* (Linnaeus), NORTHERN PHALAROPE.—At Camp Kungovik, on June 26, 1929, a phalarope was observed flying at fairly close range, which immediately aroused suspicion; it answered fully to the description of the male of this species. On the following day under similar circumstances another solitary male was noted which was positively identified. Unfortunately, a specimen was not secured. Manning (Bray and Manning, 1943: 526), however, took one male and two females in the vicinity of Taverner Bay during July of 1939 and 1940. Peters (Shortt and Peters, 1942: 344) saw a flock of six phalaropes at sea near Lake Harbour on August 14, 1939, which were believed to be of this species.

41. *Stercorarius pomarinus* (Temminck), POMARINE JAEGER. Eskimo: *Ėshūn''-gāk'*.—A comparatively rare bird in this region. The writer secured only one questionable sight record of the species among the Foxe Islands in 1926, and during

the season of 1928, no record at all. In 1929, the bird was first noted near Camp Kungovik on July 1. A single individual flew close over camp, affording a good view and certain identification. Two others were seen the following day in the same locality—the last record for the season. According to the Eskimos, this species occurs sparingly between White and Gabriel straits in southeastern Baffin Island; breeding uncertain. It was not observed by the writer in 1930–1931.

42. *Stercorarius parasiticus* (Linnaeus), PARASITIC JAEGER. Eskimo: *Eshung'-nikk'*.—Birds answering to the description of this species were repeatedly observed between capes Enaulik and Weston, August 19 to 26, 1928. A juvenile, 17 inches in length and capable of short flights, which appears referable to *parasiticus*, was taken at Cape Weston on August 24.

At Camp Kungovik it was first noted on June 5, 1929, and a single specimen collected. Thereafter it increased in numbers until the middle of the month and continued to be a common inhabitant of the tundra throughout the summer. *Parasiticus* breeds commonly on the tundra about Bowman Bay. The first nest, with two fresh eggs, was found on June 28, situated on a grassy strip of tundra flanked by small, shallow pools. The nest was simply a shallow depression in the ground $1\frac{1}{4}$ inches deep and 7 inches wide, lined with dead grasses. Both sexes make great outcry and commotion when the nest is approached. Two other nests of the species were found a few miles south of Camp Kungovik on July 1 and 8, respectively. The former contained two eggs and the latter, one—all in a fresh condition. The one nest was similar to that already described, but in the other the grass lining was all but wanting and the egg, consequently, rested in direct contact with the wet clay.

On July 27, two downy young, about three days old, were collected from a nest on the swampy lowland south of Cape Alberta. Upper parts are dark, ashy gray; under parts nearly the same general hue, but considerably lighter; feet and legs, bluish cream color. In their concern for the young, Parasitic Jaegers are even more demonstrative than when attempting to protect the nest and eggs. The characteristic call of the species is a loud, high-pitched, though rather soft, cat-like wail resembling *e-yow, e-yow, e-yow, e-yow*. The species was noted daily along the low, northern coast of Foxe Peninsula from Cape Alberta to Kommanik River. While we were ascending this stream to Ungmaluktuk Lake, it was frequently observed, but south of this to Hudson Strait, it was apparently absent.

Jaegers of any species are consistently scarce in the Lake Harbour region. The present species was not seen. The Eskimos say that a few individuals make an erratic appearance during the summer, but they appear uncertain respecting the possibility of its nesting within the area.

43. *Stercorarius longicaudus* Vieillot, LONG-TAILED JAEGER. Eskimo: *Kumä-gäll'ik'*.—The Eskimos have so named this bird because of its dark feet, as though booted—hence the term *kumagalik*, from *kummik*, or boot. This is not a species of very common occurrence in southern Foxe Peninsula, though it may be seen at long intervals along the seacoast.

In 1929 it was first observed at Camp Kungovik on June 9, when specimens were secured. The following day, two flocks were seen, consisting of 25 and 8 individuals, respectively. It was not again noted until June 16, after which it was observed daily throughout the summer in practically the same numbers as the Parasitic Jaeger. On July 1, the earliest nest of the species was located, with two fresh eggs. The structure is very similar to that of *parasiticus*—a slight, round depression in the moss and earth of the open tundra, sparingly lined with dead grasses. Two more nests

were found on July 4, each with two eggs in a fresh condition. Nests are invariably placed on grassy undulations of the tundra somewhat elevated above the shallow pools and sodden surroundings of water-saturated moss. This species was never observed to prostrate itself on the ground and wave its wings overhead to attract attention from the nest, as is the habit of *parasiticus*. It does, however, fly over the intruder fearlessly, with loud calls, in swift and dashing manoeuvres, with the repeated menacing swoops being of somewhat disturbing proximity.

As with the Parasitic Jaeger, this bird was found to be common in early August about Cape Alberta and west along the coast to Kommanik River. Nowhere was it noted in the interior south of the northern plain flanking Foxe Basin. The habitat, breeding range, and general numbers of these two jaegers appear to be practically identical for the region investigated. The species was not observed in the Lake Harbour region during 1930-1931. It is reported by the Eskimos as very sparingly distributed in the area during the summer; its breeding is uncertain.

44. *Larus hyperboreus hyperboreus* Gunnerus, GLAUCOUS GULL. Eskimo: *Nōwēd'vikk'*.—A common and widely distributed species along the southern and eastern coasts of Baffin Island, being more abundant, however, in the latter region. It is to be seen daily in varying numbers all along the southern coast of Foxe Peninsula but, strangely enough, appears to be absent from the west coast north of Trinity Islands. In 1928, large numbers were seen from Cape Dorset to Andrew Gordon Bay, up to October 15, after which they grew rapidly scarcer, although a few remained until November 12.

In 1929, the first individual was seen at Camp Kungovik on June 11. Throughout the season the species was no more than a straggler there, for very few examples were seen. It was apparently absent from the north coast of Foxe Peninsula in early August, as well as from the interior via Tessikjuak Lake to Hudson Strait.

This is the common gull in the Lake Harbour region. In 1930, the writer found the species plentiful in August all along the coast from North Bay to the west end of White Strait. During September, October, and the early days of November, numerous individuals, and occasionally large flocks, occupied North Bay to its extremity at Lake Harbour. The first spring appearance here in 1931 occurred on May 24, followed by numerous individuals within three or four days. At this time the open sea beyond the land-fast floe was 12 miles distant. The birds seemed to be feeding on the droppings of sledge dogs, which were plentifully distributed on the sea-ice near the settlement.

This big gull, despite the cold, foul weather that often persists until the middle of June, begins to lay its eggs early in that month. Favorite nesting places are shelving ledges of perpendicular cliffs overlooking the sea. In 1931, the Eskimos first detected fresh eggs on June 7. On June 10, the writer found a number of the birds nesting on grassy ledges of a cliff at Soper Lake. The nests were rather bulky affairs of old vegetation and contained one or two eggs. At this time the lake below was covered with ice several feet thick, but the nesting ledges and most of the surrounding land were free of snow. Around the breeding colonies the birds are very shy; immediately one approaches they quit the nests and fly back and forth and in sweeping circles at some distance from the cliff, maintaining a deafening clamor. Not infrequently they nest in company with either Kumlien's or Herring Gulls, or both.

In early July, the Glaucous Gull was observed many miles up Soper River, where they were probably hunting for small fish. Later in the month, large numbers were encountered along the coast from North Bay to Philpot Bay, southeast of Icy Cape.

Nesting colonies were observed at several places between the two localities. On the north shore of Itivirk Bay, a pure colony occupied the face of a high, shelving cliff where the young were being tended in bulky nests. Such nesting places on the ascending ledges are conspicuously lush and green with grasses and other vegetation, obviously the result of fertilization by innumerable generations of swarming inhabitants. Glaucous Gulls constitute one of the most characteristic sights of the seaboard environments of southern Baffin Island.

Bailey collected a female, and also eggs almost ready to hatch, on an island off Big Island on June 18, 1930; he took a male at Lake Harbour on June 1, 1931. On July 20, 1938, Shortt found a breeding colony of about 20 pairs on a high, inaccessible cliff near Glasgow Falls, southeast of Lake Harbour (Shortt and Peters, 1942: 345).

*45. *Larus leucopterus kumlieni* Brewster, KUMLIEN'S GULL. Eskimo: *Nōw-yā-dā'*; *Nōw-cūp'zā'* *nōw'yā*.—During the summers of 1928–1929, the writer found this bird common in the general neighborhood of Cape Dorset, with breeding colonies on the mainland north of the west end of Okoliltuk Island and on Foxe Islands near Andrew Gordon Bay. The Eskimos described other breeding colonies in the region, which were not seen by the writer. In mid-August, 1928, *kumlieni* was commonly met with to the westward as far as King Charles Cape, but none was found beyond this northward to Cape Dorchester. In the summer of 1929, it was nowhere observed in the interior north of Andrew Gordon Bay, nor along the Foxe Basin coast. Numbers were frequently seen about Cape Dorset in early September, but after that they became very scarce; the last record was on October 11. These birds are markedly more local in distribution than the Glaucous and Herring Gulls and unquestionably migrate from the region much earlier in the autumn than either of the others.

In the Lake Harbour region, the species is locally common and nests in several localities. It appears to be strictly maritime in its associations during the breeding season, at least, for, unlike several other species of gulls in Baffin Island the writer has never once observed it inland along lakes and streams, nor nesting in other than the immediate vicinity of the sea.

On June 7, 1931, a small breeding colony was found on an island in Soper Lake, when many of the nests contained fresh eggs. Large numbers of Kumlien's Gulls were discovered at various places along the coast from Lake Harbour to Icy Cove. A particularly notable nesting colony of about three hundred individuals was observed in mid-July at the northern extremity of Itivirk Bay. It was quite impossible to reach these nests, but they were seen to hold immatures still being tended by the adults. The latter afforded a memorable sight as in a restless cloud they wheeled hysterically in dexterous evolutions against the bleak façade of the great promontory. Contrary to frequent practice, no other gulls were seen associating with *kumlieni* in this colony. The local Eskimos assert that these birds nest eastwards from Itivirk Bay to Gabriel Strait and north into Frobisher Bay. In view of all the facts available at this time, they apparently have a more or less unbroken breeding range along the coast from Cumberland Sound to Foxe Peninsula.

46. *Larus marinus* Linnaeus, GREAT BLACK-BACKED GULL.—The only individual observed on the 1928–1929 expedition passed over Camp Kungovik on June 20, 1929, but unfortunately was not secured. Regarding this, Mr. Taverner remarks in a memorandum that this is the northernmost record for the species on Baffin Island, and that the nearest valid record is Cape Chidley, Labrador. The species was not seen in the Lake Harbour region during 1930–1931.

47. *Larus argentatus smithsonianus* Coues, HERRING GULL. Eskimo: *Nūw'yā*.—This is the most common and uniformly distributed of all the gulls inhabiting the Foxe Peninsula coasts. It is a regular breeder in the Cape Dorset district and becomes even more abundant on the west coast in the vicinity of Cape Enaulik and north to Cape Dorchester. The birds were observed daily between Dorset and Andrew Gordon Bay during mid-September and also along the lake-chain northward to Tessikjuak and Ungmaluktuk Lakes. Large flocks were particularly notable about Cape Dorset between October 10 and 15, 1928. The last straggler was seen on October 26.

The following spring it was first noted here on April 28, and became plentiful by the second week of May. Herring Gulls were first observed at Bowman Bay on May 25, but did not become common until after June 10. The earliest nest, containing a single egg, was found at Blue Goose River on June 20. The bird is a familiar breeder along the lower reaches of this stream where several nests were examined, with young three or four days old, between July 21 and 24. The birds were very common (July 26–August 6) at Cape Alberta where practically every small lake had one or more nests with downy young, placed on boulders protruding from the water. Many were observed daily from this point west to Kommanik River and across the interior to Hudson Strait.

The subspecies is universally distributed in the Lake Harbour region, but is not so numerous as farther west. It regularly resorts to various breeding places along the coast and in the interior, habitually nesting on cliffs beside the sea as well as about inland lakes. Many pairs nest solitarily on low-lying rocks in streams and lakes, and this trait, on the whole, appears to the writer more characteristic of the form on Baffin Island than the colonial habit near salt water. In some cases it nests in close association with Kumlien's and Glaucous Gulls on cliffs of the mainland and the coastal islands. The reproductive date is usually early in the third week of June and coincident with that of the other species of gulls with which it may be nesting. The young are usually hatched during the second week of July.

All birds examined from southern Baffin Island are unmistakable *smithsonianus*. No trace of *thayeri* has been detected, though it may be expected as a regular migrant along the extreme eastern coastlines and as an occasional straggler elsewhere.

48. *Pagophila eburnea* (Phipps), IVORY GULL. Eskimo: *Kūn'nik'*.—*P. eburnea* is clearly only a rare straggler in southwestern Baffin Island, whether individually or in flocks. The writer first noted a single individual at Cape Dorset on November 11, 1928. On December 9, an Eskimo brought to the post a badly mutilated specimen which he stated had been shot from a flock at Andrew Gordon Bay in late October. The species was not seen in 1929, nor was it personally observed in the Lake Harbour region, 1930–1931. A few wanderers are reported by the natives during the autumn. It is believed to nest nowhere in this region but may do so in northern parts of the island.

49. *Rissa tridactyla tridactyla* (Linnaeus), ATLANTIC KITTIWAKE. Eskimo: *Kān'ū*.—Unquestionably a very rare bird along the Foxe Peninsula coasts. One was seen at Cape Weston on August 26, 1928, and none at all anywhere in 1929. Possibly it occurs more commonly at times, as many of the natives appear to be familiar with it. The Lake Harbour Eskimos report it as a rare summer straggler. The Kittiwake is obviously scarce all along the south and west coasts of Baffin Island where nothing is known of its nesting. The writer did not see it in 1930–1931. The species is fairly common along the east and north coasts of the island and at points farther north.

*50. *Xema sabini sabini* (Sabine), SABINE'S GULL. Eskimo: *Nū'yāllū'gā*.— This little gull is of comparatively rare occurrence along the south and west coasts of Foxe Peninsula. During the season of 1928, only four were seen, which composed a small flock in Tellik Inlet, near Dorset Harbour, on October 12. It was next observed at Camp Kungovik, Bowman Bay, on June 14, 1929. The first spring migrants were solitary birds, but on June 16 they began to arrive in flocks varying from ten to twenty-five individuals. Numbers steadily increased until June 26, when they became one of the most familiar birds of the region. That the two sexes arrived together and in about equal numbers is borne out by a series of specimens preserved at this time.

The species breeds abundantly on the lowlands along Bowman Bay. On July 2, a dozen nests were found in a small colony of twenty pairs, four of which held incomplete sets of one to three eggs. Solitary nests were discovered during the next few days, demonstrating that the species does not always nest in colonies. Nine sets of eggs collected in a colony on July 10 were noticeably incubated, with the exception of four sets which were perfectly fresh. Nests were invariably constructed of mosses common to pool-side areas, firmly and neatly knitted together and sparingly lined with dead grasses. All were built directly upon the low, moist ground of pool margins, or on little hummocks and islets a few feet from shore.

After we left the Blue Goose plain on July 24, Sabine's Gull was frequently observed about Bowman Bay, and during late July and early August everywhere over the pool-sprinkled lowlands at Farley Point and Cape Alberta. From there to the mouth of Kommanik River it was seen daily in moderate numbers, after which it was not again encountered. In view of the general character of the country, the species is almost certain to nest throughout the coastal region of the northern part of Foxe Peninsula.

The species was nowhere observed in the Lake Harbour region during 1930-1931. The Eskimos report a few here during the autumn; no nesting places are known. At best, it exhibits a very sparing and irregular distribution in this eastern section. Individuals and flocks observed in Hudson Strait may be safely regarded as en route to, or from, the extensive breeding grounds to the west, or merely as non-breeding stragglers with no definite objective during the open season. In some districts of Baffin Island the species is very rare or unknown. Bailey took a specimen on Big Island in late July, 1932 (Shortt and Peters, 1942: 345).

51. *Sterna paradisaea* Pontoppidan, ARCTIC TERN. Eskimo: *Emākāā'lāk'*.— These birds were not met with anywhere in the Cape Dorset region during late summer and the autumn, but they are common on the west coast of Foxe Peninsula north of Trinity Islands. During late August, 1928, they were found in large numbers among the Bird Islands northwest of Cape Enauolik, at Nuwata, and northward to capes Weston and Dorchester. Numerous flocks of hundreds of individuals were seen during late August in the latter region, where they are said by the Eskimos to breed abundantly.

The species was next observed at Camp Kungovik on June 9. Unlike *Xema sabini sabini*, these birds made their appearance en masse in flocks numbering up to thirty and forty individuals. Thereafter they were observed daily in small flocks or pairs, and as individuals. Flocks of sixty to eighty birds were persistently observed well into July, in association with Sabine's Gulls. Most of these were evidently non-breeding birds, as extensive search by the party failed to discover a single nest. [The species is now known to nest along the coast to the north (Manning, 1943: 530).] In late July the birds were common at Cape Alberta and nests were found on islets of

many small lakes in the vicinity, containing downy young a few days old. Similar nests and nestlings were noted at Cape Ketoria on August 6. The species was common all along this coast and into the interior to the northern part of Tessikjuak Lake.

Paradisaea was not observed in the Lake Harbour region during 1930-1931. The Eskimos, however, are quite familiar with it and state that straggling individuals and small flocks are sometimes commonly observed, especially during the autumn. The natives appear to know of no nesting places in the district.

52. *Uria lomvia lomvia* (Linnaeus), BRÜNNICH'S MURRE. Eskimo: *Auk'pa*.—Brünnich's Murre was nowhere observed during the 1928-1929 expedition to the southwestern part of the island. Those that occasionally appear on the north side of Hudson Strait, such as observed by the writer between Chorkbak Inlet and Cape Dorset in May, 1926, are doubtless wanderers from the large breeding colony at Cape Wolstenholme, northern Quebec.

In the Lake Harbour region, occurrence is normally sparing and erratic, though the natives state that in some seasons considerable numbers temporarily appear during spring and early summer, in the open sea south of Beacon Island and about High Bluff and Big Islands. These birds probably come from the large rookeries reported by Davis (1936: 330) on Akpatok Island. It appears from Eskimo reports that breeding places may exist on the cliffs of Resolution Island and possibly on the sheer rocky promontories of the opposite coast along Gabriel Strait. If true, these are the only known nesting places in the whole of extreme southern Baffin Island. There is further indication that breeding colonies also occur somewhere along the coast between Frobisher Bay and Cumberland Sound. The birds are not known to nest anywhere in the latter sector, but Eskimos report large nesting colonies of them in the vicinity of Merchants Bay. The species was nowhere observed by the writer in the Lake Harbour region during the expedition of 1930-1931.

53. *Plautus alle* (Linnaeus), DOVEKIE. Eskimo: *Auk'pilleduk'tuk'*.—The Dovekie rarely occurs in the Foxe Peninsula region. It was not observed in this sector by the writer during the summer of 1926, nor during the expedition of 1928-1929. Most of the southwest Eskimos know the species only by account. Though this proves its rarity in the region, occasional wanderers entitle the species to a place in the avifauna of the peninsula. On April 17, 1929, an Eskimo gave the writer a single specimen of Dovekie which he had shot at a tide-rip in Chorkbak Inlet two days before. He remarked that this was the first *Aukpilleauktuk* that he had ever seen. The species is rarely observed in the Lake Harbour district; it was not personally encountered in 1930-1931. Southeastern Eskimos state that flocks are sometimes seen during migration along the coast much farther to the east. It occurs in large numbers during fall and early winter at Port Burwell and off the eastern entrance to Hudson Strait. So far as the writer could gather, there is no evidence that the species breeds anywhere on Baffin Island.

54. *Cephus grylle arcticus* (C. L. Brehm), NORTHERN BLACK GUILLEMOT. Eskimo: *Pw'ulak'*.—A very common sea bird in the Cape Dorset district, where it breeds on several small, rocky islands possessing crevices and slopes of boulder talus in which nests may be suitably secreted. Pitulak Island is such a resort (named by the Eskimos for this species), and annually supports a busy, breeding population; other nesting islands exist east of Parketuk Bay. In Foxe Channel, guillemots were found in considerable numbers (August, 1928) as far north as Nuwata. They tarry abundantly off the south coast until mid-October, after which numbers gradually

diminish. The last authentic record for 1928 was a flock of twenty at a tide-rip, near Tenetuk Island, on November 12.

Early in the spring, before nesting begins, flocks of almost incredible numbers resort to the sea along the edge of the land floe. Here they rest on the ice and feed on the abundant plankton common to the salt waters of the Arctic. Though they are very numerous in late April, maximum abundance is apparently not reached until the middle of May. During the summer of 1931 they were nowhere seen about Bowman Bay, but small, scattered groups were met with during August in the field-ice between Cape Alberta and Cape Ketoria.

The bird is common in the Lake Harbour district, where it breeds in the crevices of rocky islands that lie scattered in bewildering profusion along the coast. This is particularly true of that sector between Big Island and Chorkbak Inlet. In 1931, the first guillemots were seen on February 28, in the swift, open waters of White Strait. By early May they were in countless thousands off the floe edge near Beacon Island. The birds nest from the last days of June until late July; the period of egg-laying varies greatly even among individuals of the same colony. The writer has collected fresh eggs from June 27 until July 25. These birds stay late in the autumn, and many individuals even remain throughout the winter; they have been personally recorded during all the winter months. At this season they are forced far out beyond the land-fast floe in Hudson Strait, or resort to swift tide-rips which remain open at prominent capes and bottle-neck narrows in bays and fiords.

(To be continued)

GENERAL NOTES

The Koels of the Bay of Bengal.—While examining Ceylon specimens of the Koel, *Eudynamis scolopacea*, I have had occasion to look over the series of these cuckoos in the collections of the U. S. National Museum, as well as additional material in the American Museum of Natural History. I am most grateful to the authorities of these institutions for allowing me to examine these specimens. The following measurements are all in millimeters.

Previously, *vide* Peters (Birds of the World, 4: 37, 1940), the range of *Eudynamis s. scolopacea* included the Andaman and Nicobar Islands. Specimens in the collections seem to disprove this as follows:

Eudynamis scolopacea scolopacea (Linné)

Specimens from India and Ceylon measure as follows (in millimeters):

	Wing	Tail	Culmen
4 ♂♂	191-198 (av. 194.5)	184-202	28-28.5
8 ♀♀	185-197.5	180-194	27.5-29

In addition, Whistler and Kinnear (Jour. Bombay Nat. Hist. Soc., 37: 524, 1935), and Whistler (*Spolia Zeylanica*, 23: 217, 1944), give the following measurements:

	Wing	Tail
India, 3 ♂♂	187.5-193	186-195
Ceylon, 2 ♂♂	194.5-197	187-193
India, 2 ♀♀	194	190, 192

Female adults are usually white-spotted, with rufous-tinted streaks on the head.

RANGE: India; Bombay Presidency south of the Godavery, Madras and south India; Ceylon.

Eudynamis scolopacea malayana Cabanis and Heine

Specimens from Sumatra and the Malay Peninsula measure:

	Wing	Tail	Culmen
♂♂	203-218	194-198 (one, 208)	31.5-36
♀♀	199-213 (one, 221)	190-202 (one, 210)	29-31.5

Female adults have a more buffy tint to the plumage than the preceding form as noted by Chasen (*Handlist Malay Birds*: 128, 1935). I would call this tint buffy rather than rufous.

RANGE: Assam, Burma, Malaysia, etc., as noted by Peters (*l. c.*: 37).

Eudynamis scolopacea simalurensis Junge

Specimens measure:

	Wing	Tail	Culmen
♂	195, 211	197	36
♀ (? im.)	190.5	186	30

In this form the female is distinctly rufous both above and below, with the general proportions of *malayana*.

Eudynamis scolopacea dolosa, subsp. nov.

TYPE: ♂ ad. U. S. N. M. No. 178508, collected by Dr. W. L. Abbott on Barren Island, Andaman Islands, January 7, 1901.

DIAGNOSIS: This race differs from *Eudynamis s. scolopacea* by larger size, and in the female by a tendency to darker, more buffy-spotted plumage both above and below.

From *malayana* this race differs by a smaller wing-tail index, and in the female by a tendency to darker, more buffy-spotted plumage both above and below. Two females from Barren Island are very dark buffy in color, whereas two females from South Andaman in the A. M. N. H. collection are not distinctively darker than females of *malayana*. However, the wing-tail index in these birds runs between 90 and 91%, while in the case of *E. s. scolopacea*, the wing-tail index is over 95%, and in examples of *malayana* measured, the wing-tail index runs between 95 and 100%.

From *simalurensis*, this race differs by the paler color of the females.

A series measures:

	Wing	Tail	Culmen
3 ♂ ♂	207.5, 211, 212 (type)	189, 191 (type), 192	30, 31, 31 (type)
4 ♀ ♀	201-216 (208)	184-194 (190.5)	30-34 (31.5)

In this race I would include birds from the Nicobar Islands. I have examined four males and three females from Car Nicobar, Little Nicobar and Great Nicobar. The measurements are enormously variable:

	Wing	Tail	Culmen
4 ♂ ♂	202.5, 203.5, 233, 235	189 (2), 221 (2)	32-34
3 ♀ ♀	201-208	188-197	31, 32.

However, in coloration these birds are similar, and the wing-tail index in the Nicobar birds runs from 93 to 94%.

RANGE: Andaman and Nicobar Islands.

The labels on the specimens note that this form feeds on fruit and is very numerous on Barren Island. Soft parts: iris red; bill of male pale green, of female greenish horn; feet plumbeous.—S. DILLON RIPLEY, *U. S. National Museum, Washington, D. C.*

The status of *Dendroica auduboni nigrifrons* in the United States.—About a year ago, I had the opportunity to examine more than one hundred male specimens, as well as females and immatures, of *Dendroica auduboni* from New Mexico and Arizona, the latter coming from the Huachuca, Chiricahua and Catalina mountains. These were measured and compared carefully with a series of twenty-two specimens of *Dendroica nigrifrons* (Brewster) in the Moore Collection, from several localities in southwestern Chihuahua, fourteen of which are breeding adults taken at Laguna Juanota and Los Frailes in southwestern Chihuahua, a little over a hundred miles southeast of the type locality of *nigrifrons*. In addition, I have inspected (not synchronously) the cotypes and the topotypical series in the Museum of Comparative Zoölogy, as well as smaller groups in other museums. There are also in the Moore Collection one hundred and ten specimens of *Dendroica auduboni auduboni* and *D. auduboni memorabilis*. Of the borrowed males from Arizona and New Mexico, forty-one are adults. It is my belief that these three mountain ranges of Arizona and certain high areas of New Mexico constitute an area of intergradation between *memorabilis* of Colorado and *nigrifrons* of southern Chihuahua, that most of the breed-

ing birds of this region are pure *memorabilis* and a smaller percentage are intergrades between *memorabilis* and *nigrifrons*, nearer to the former.

It is obvious that the reason *nigrifrons* has been credited as occurring in Arizona and New Mexico is the inadequate character of the type series from Pinos Altos, Chihuahua, on which Brewster based his description. He had only five specimens, from which he chose three to be cotypes—an adult male, female and juvenal. Of the other two, one is a "young bird in first plumage." My series proves that Brewster did not sufficiently emphasize either the extensiveness of the black on the under parts or the larger size. In addition, he failed to realize that the white patch on the wings, when not worn, usually is larger and less restricted than that of the more northern birds. My series indicates that male *nigrifrons* from southwestern Chihuahua, as compared either with true *auduboni* or *memorabilis*, has the following five distinct characters:

- (1) Auriculars and forehead solid black;
- (2) Back in most of my breeding males, almost solid black, interrupted with a few narrow streaks of gray;
- (3) Under parts in most breeding males black all the way to the under tail-coverts;
- (4) White patch on wings averaging larger and more conspicuous;
- (5) Size larger, averaging for the wing of adult males 83.2 mm. (79.2–86.4), as compared with an average of 80.0 mm. (75.6–85.6) for forty-one adult males of *memorabilis*, and an average of 74.9 (71.5–77) mm. as given by Oberholser (Ohio Journ. Sci., 21: 240, 1921) for *auduboni*. Oberholser's average of 81.8 for *nigrifrons* apparently includes the intergrades from Arizona, which I believe to be *memorabilis*.

The females are also well marked in the breeding plumage, but the characters of the males are sufficient indicators for our purpose.

Of the forty-one breeding male intergrades from this region of Arizona and New Mexico, the majority are unquestionably *memorabilis* in all their characters and only thirteen have any of the five characters of *nigrifrons* well developed. All except one of these are nearer to *memorabilis* than to *nigrifrons*. In the entire lot there is just a single male, a specimen belonging to the California Academy of Sciences, which is nearer to *nigrifrons* than to *memorabilis*, but even this individual is not pure *nigrifrons*.

For the courtesy of loans I am deeply indebted to Robert T. Orr of the California Academy of Sciences and to John T. Zimmer of the American Museum of Natural History.—ROBERT T. MOORE, *California Institute of Technology, Pasadena, California*.

The type locality of Franklin's Grouse.—In part 1, number 1, of the Catalogue of Birds of the Americas, I stated in a footnote on page 213 that Major Allan Brooks had informed me that Franklin's Grouse, *Canachites franklinii*, was not found at Okanagan. What he actually had written me was that it was not found at *Okanagan Landing*, the restricted type locality as given in the 4th edition of the A. O. U. Check-List. On publication of the volume, Major Brooks called my attention to the mistake. He also wrote that while the Landing did not afford its zonal habitat, this grouse was common in many parts of the Okanagan fifteen miles away. In justice to Major Brooks this correction should have been published long ago.—BOARDMAN CONOVER, *Chicago, Illinois*.

A long-standing error.—In the standard works of Wilson, Audubon, and Nuttall, and also in 'Birds of the Northwest' (Coues, *t. c.*: 543, 1874), the name "flusterer" is credited to the Coot (*Fulica americana*), an attribution seemingly trace-

able to Pennant (Arctic Zoology, 2: 496, 1785). As the last author cites the term from Carolina, it is apparent that he derived it from Lawson's 'History of Carolina.' There were various editions of this work, the first of which, in 1709, was entitled "A New Voyage to Carolina." Gurdon Trumbull (Names and Portraits of Birds: 119, 1888) states that "Lawson nowhere mentions the term 'flusterers' alone" and quotes Lawson's account as follows: "Black Flusterers; some call these Old Wives; they are as black as ink, the cocks have white faces, they always remain in the midst of rivers, and feed upon drift grass, carnels or sea-nettles; they are the fattest fowl I ever saw, and sometimes so heavy with flesh that they cannot rise out of the water; they make an odd sort of noise when they fly. What meat they are, I could never learn. Some call these the great bald Coot."

Making only slight allowance, it is obvious that these birds were Surf Scoters (*Melanitta perspicillata*), and it is probable that of the three vernacular names given, "old wives" involves confusion of the Old-squaw, well known under that term. It may be added that the names "ball coot" (Jefferson, Notes on the State of Virginia: 118, 1782) and "bald coot" (Morse, American Geography: 59, 1789) probably were merely abbreviated from Lawson's work. Not all of Lawson's birds are recognizable, but the accounts of all that are identifiable should be properly incorporated in modern works.—W. L. McATEE, Chicago, Illinois.

Dates for Volume 1 of Bonaparte's 'Conspectus Generum Avium.'—In the lists of "Donations to Library" given in Volume 5 (1850-1851) of the Proceedings of the Academy of Natural Sciences of Philadelphia, I find that certain parts of Volume 1 of the 'Conspectus Generum Avium' are acknowledged as received from the author on dates somewhat in advance of those currently accepted. Dates which are tentatively accepted by Zimmer (Catalogue of the Ayer Library, 1926) for Volume 1 are as follows:

"Part 1," pp. 1-272, before June 24, 1850

"Part 2," pp. 273-543, before February 3, 1851

The Proceedings dates are:

pp. 1-160, June 18, 1850

pp. 161-"234" [232], July 16, 1850

pp. 233-344, October 15, 1850

pp. 353-400 October 15, 1850

Concordance of the earliest "noticed" dates as cited by the Proceedings and Zimmer result as follows:

"Part 1," pp. 1-160, before June 18, 1850; pp. 161-272, before June 24, 1850

"Part 2," pp. 273-400, before October 15, 1850; pp. 401-543, before February 3, 1851

Considering the slowness of transportation in 1850, the actual dates of issue must have been some weeks earlier, although possibly somewhat later than those which appear on the various signatures. At any rate, Zimmer's supposition that "Part 2" actually was published before the end of 1850 is thus verified in part. This is certainly true for pages 273 to 400, inclusive.—A. J. VAN ROSSEM, Los Angeles, California.

Corrections and additions to the published records of Siamese Birds.—Riley (U. S. Nat. Mus., Bull. 172: 73, 1938) lists a specimen of *Polyplectron germaini* Elliot from "Huey Yang, Kao Luang, Nakon Sritamarat." Despite the assertions of Beebe (Monograph of the Pheasants, 4: 74, 1922) and Delacour and Jabouille (Oiseaux de l'Indochine Française, 1: 242, 1931) that the species inhabits southern

Siam, no one before Riley has definitely recorded it from any Siamese locality, much less from a place south of the Isthmus of Kra and thus in the Malaysian Subregion. P. R. Lowe (Ibis: 480-482, 1925) has shown that Beebe mistook for *P. germaini* the bird later named *P. b. bailyi* Lowe; Delacour and Jabouille seem to have based their statement on Beebe.

The specimen, U. S. N. M. No. 330131, was, in fact, taken by H. M. Smith on October 7, 1930, along the stream Huai Yang, on the frontier mountain Khao Luang, southwest of Prachuap Khirikhan, S. W. Siam. Smith's visit to the Malaysian Khao Luang west of Nakhon Si Thammarat took place in July, 1928. It should be noted that Khao Luang ("Great Mountain") is popularly or even semiofficially applied to the most prominent peak in any given district, and the term should never be used on a label without reference to the province or nearest important town.

The bird in question is inseparable from other females of *Polyplectron bicalcaratum bicalcaratum* (Linnaeus), which is the peacock-pheasant long known to occur in southwestern Siam. Until proof is adduced for its presence. *Polyplectron germaini* must be removed from the list of Siamese birds.

The Lesser Sand-Plover, *Charadrius mongolus*, has been known from the coasts of Siam since 1896; the numerous specimens, probably for the most part in winter dress, have been about equally divided in print between *C. m. mongolus* and *C. m. atrifrons*, presumably on a supposed difference in length of tarsus.

A series of six birds taken by me between April 22 and May 6, 1937, on the sandy flats between Chanthaburi and Tha Chalaep, southeastern Siam, run from complete winter plumage to complete nuptial dress. Of the six, three are in sufficiently advanced summer dress to be unhesitatingly identified as *Charadrius mongolus schäferi* de Schauensee (Proc. Acad. Nat. Sci. Philadelphia, 89: 340, 1937); the three others almost certainly belong here as well.

Sixteen Siamese specimens recorded by Riley as *C. m. atrifrons* (U. S. Nat. Mus., Bull. 172: 87, 1938), and one other as *C. m. mongolus* (tom. cit.: 88) are birds in winter dress and thus not certainly identifiable to subspecies; all, however, have the dark upper parts of *mongolus* and *schäferi*, and since *mongolus* is not certainly known anywhere west of British North Borneo (see Chasen, Handlist Malaysian Birds: 33, footnote, 1935), it is highly probable that all of these should also be called *schäferi*. It is likely that *schäferi*, although not previously recorded from its winter quarters, will prove to be the only form regularly wintering in Siam and the western portions of Malaysia.

Search through the literature has brought to my attention the curious fact that there is still no definite record, based on specimens, for the occurrence of the Whimbrel, *Numenius phaeopus*, on the coasts of Siam. Robinson and Boden Kloss (Ibis: 12, 1911) list the species as "numerous along the coasts of the [Malay] Peninsula throughout the winter months," but give no indication that they have seen specimens from the Siamese portion; Robinson and Chasen (Birds of the Malay Peninsula, 4: 142, 1936) simply paraphrase the same vague statement. Gyldenstolpe (Kungl. Svenska Vet.-Akad. Handl., 50: 69, 1913) asserts that it "occurred in great numbers among the wading-birds which had their winter-quarters along the coasts of the Gulf of Siam" (= the mudflats south of Pak Nam at the mouth of the Chao Phaya River), but lists no specimen collected by him; the same author later (Ibis: 758, 1920) says that *Numenius phaeopus variegatus* is "found in small numbers along the coast during the winter-time."

The species is nowhere mentioned as having been taken by Herbert, Williamson, Aagaard, Abbott, Smith, de Schauensee, or other collectors in Siam. It is therefore

worthy of note that I found the Whimbrel in small numbers on the sandy flats between Chanthaburi and Tha Chalaep, southeastern Siam, in May, 1937, and succeeded in collecting four specimens. Of these, three (taken on May 4 and 6) are good examples of *Numenius phaeopus variegatus* (Scopoli); the fourth, taken on May 4, is an equally good example of *Numenius phaeopus phaeopus* (Linnaeus).

The collection of an adult female of Macklot's Sunbird, *Chalcostetha calcostetha* (U. S. N. M. No. 337143), in a mangrove swamp between Chanthaburi and Tha Chalaep, on May 1, 1937, makes an interesting addition to the small number of characteristically Malaysian species now known to have discontinuous distribution on the two sides of the Gulf of Siam, and goes far to lend credibility to Tirant's early record for the bird in Cochinchine, whence it has apparently not been reported in the modern period.—H. G. DRIGNAN, U. S. National Museum, Washington, D. C. [Published with the permission of the Secretary of the Smithsonian Institution, Washington, D. C.].

Avian leukosis and the Great Black-backed Gull.—In company with John Phillips, son of the late great duck authority, I was canoeing in Wellfleet (Massachusetts) Bay last December 11 when, rounding a spit of sand, we flushed up from it a veritable umbrella covering of gulls. However, one Great Black-backed Gull remained behind where it had toddled to the water. It swam very weakly when we approached it in the canoe; and, though its plumage appeared in excellent condition (which later closer scrutiny verified), it obviously was ill. G

I stepped from the canoe into the shallow water, dropped over its head a piece of sacking to protect my fingers from its bill, and put the whole contrivance, gull and sacking, in the bottom of the canoe. To my surprise the gull offered no resistance. When we had reached the mainland I tied it by a string to a large stone while carrying the canoe across the beach to the car. Still the gull made no attempt to fly, although it did try to get to its feet, but unsuccessfully, as if its capture had drained away the little strength it had.

Returning to the house where I was visiting, I caged the gull and offered it a little bread and some boiled herring which it refused. By gently moving the gull with my hand I could see that its legs and feet were greenish blue instead of faintly pink; also that it was very thin, with its keel-bone sharply showing. Otherwise it seemed in good condition. Its plumage, as I have said, was excellent—firm, closely laid, a shining-pastel shade if such a combination is imaginable. It showed no signs of being 'oiled' as I had feared. Its eye was bright enough.

The day I found the gull was Monday. Wednesday I had to leave for New York. Because I did not care to kill the bird or set it free again to die, and because I could find no one willing to care for it, I put it in a large cardboard box and took it by car to Boston, by train to New York, and so on Thursday by train again to Cornwall, Connecticut, a trip of roughly four hundred miles.

Early Friday morning, the day following my return to Cornwall, I found the gull lying on its back in its cage, its feet stretched rigid in the air. It was not dead, however, and so I gently righted it. On Saturday I sought the advice of a neighbor, Mrs. Lee Garnett Day, who, I had been told, had successfully experimented with vitamin deficiency in animals, especially in birds. The gist of Mrs. Day's diagnosis and recommendations is as follows:

"The sea-gull appeared to have a partial paralysis of the legs which caused it to rest its weight on its elbows. In addition to this it suffered from malnutrition and constantly regurgitated its food. These symptoms seemed to indicate the possibility of a form of Avian Leukosis as well as Coccidiosis.

"In view of this I recommended a balanced mineral yeast combination put out by the Harris Laboratories. The yeast provided the B Complex vitamins which build up muscle tone.

"Considering the possibility of Coccidiosis being present, a 5% iodine solution in organic combination was added. Iodine destroys coccidia in the intestines, and also stimulates the glands, primarily the thyroid. It helped to supply the iodine lacking in the bird's diet. (Why iodine should have been lacking, it is hard to say. Could it have been possible that the gull had learnt to feed on garbage about the town of Wellfleet, and therefore have missed a sufficiency of sea-food?) In view of anemia resulting from either cause, a 5% compound of ferrous iron and copper in organic combination was recommended to be fed twice a week.

"I further recommended that the bird's daily diet of raw fish be soaked in a concentrated form of cod-liver oil."

Mrs. Day supplied the medicines, and I followed her instructions to the letter. Within two days the gull was standing up and seeming to retain its food which, with the medicine, had to be forcibly fed.

Within three or four days the gull was already beginning to feed freely, to bite the hand that fed it, and its feet, heretofore a greenish blue as I have described, took on a pinkish tinge. Within a week its keel-bone was markedly less obvious; it was consuming close to half a pound of fish a day. Within ten days it was fighting to get out of its cage.

By Saturday, the 12th of January, a month since I had taken it at Wellfleet, I was satisfied that it had recovered sufficiently to be liberated—that it had enough excess strength and medication to carry it from Cornwall to whatever seaboard it chose.

I 'fought' the bird out of its cage (there is no other word than 'fought' which can describe the healthy temper of the bird at this point). As soon as it was free, it began running down the snow-covered lawn against the wind and toward the valley in our view. But both because its wings were doubtless stiff and because it tripped over a footprint in the snow, it failed to clear a fence beyond the lawn. It then walked up-lawn from the fence where it had fallen. It seemed contented with its lot, 'roused out' its feathers several times, and consumed large quantities of snow although I had taken care to water it freely all the time that it was caged. It remained sitting on the snow throughout Saturday night.

Close-by where it sat there is a pigeon cote, and it is interesting to note that the presence of the gull, on the ground though it was, terrified the pigeons. I wondered whether the excessive fear of the pigeons might have in some way betrayed an atavistic fear of the Great Black-backed Gull *per se*, and thereby lend credence to the statements that such gulls do at times eat young birds.

Sunday morning was much colder, and by the time I came out of the house it was snowing hard. I had in my hand a piece of fish which I tossed to the gull. It did not deign to look at it, but with now-strengthened wings ran down the length of the lawn, cleared the fence easily, and was away, seeming—so large was its wing-spread—more like a pterodactyl than a gull.

The snow necessarily obscured my vision, making it impossible for me to see whether the gull alighted near by, and snow the following day, as well, made any search for it impossible. Tuesday, dawning clear, betrayed no signs of the gull at all. I like to think it found its way by river to the sea.—MONTGOMERY HARR, Cornwall Bridge, Connecticut.

Purple Grackles 'anting' with walnut juice.—The recent discussions of anting and supposedly substitute activities by birds make it seem worth while to de-

scribe the behavior of Purple Grackles (*Quiscalus quiscula stonei*) in anointing themselves with a juice, apparently an acid, from the hulls of English walnuts (*Juglans regia*). This activity has been noticed casually in a number of trees just beyond the southwest edge of Lancaster, over a period of about 15 years; large and noisy flocks of birds have gathered to spend hours at it, day after day through much of each summer. In 1945, the grackles were repeatedly watched at their performance for the particular purpose of presenting an account.

The grackles, of both sexes, began to come to the walnuts when these were about three-fourths developed—during the first half of June. The activity was at its height during July. After that it waned sharply, but was continued by a few birds until about the middle of August. On some mornings the birds had already gathered at 4:40 o'clock, Eastern Standard Time; on one evening the last did not leave until 7:25 o'clock. As many as 20 and 30 birds worked at a time in single trees. The numbers were largest on hot, sunny days. Sometimes the activity went on even during light rains; hard downpours stopped it, but as soon as the trees had dripped off a bit the birds were back.

The walnuts grow in clusters of as many as five and six, at the ends of branches. The grackles would alight upon these clusters—just one bird to each—and begin pecking a hole in the sticky hull of one of the nuts, usually throwing away the pieces of hull they gouged out but occasionally seeming to swallow a piece. When a good-sized hole had been made, the birds would dip their bills into it, undoubtedly wetting them against the pulpy interior, and then thrust their bills over and into their plumage. A great part of the body was thus anointed—the breast, the under and upper surfaces of the wings, the back, and very often apparently the rump at the base of the tail. Sometimes the birds made just one stroke of the bill after a dip into the nut, and sometimes many. Occasionally, after a period of this activity, they would shake themselves vigorously and then begin it all over again. When they had finally finished they would often move to a branch and preen.

Particular birds that were watched worked as long as 10 to 15 minutes at a stretch. Many males sang at intervals, with display, and there was also much noise because of commotion among the birds, two or three of which would often contest for the same cluster of nuts.

Neighboring black walnut trees (*Juglans nigra*), which contained nuts during this same period, did not attract the grackles. It is to be noted that the hulls of black walnuts are extremely hard, and also dry in contrast to the gumminess of the English walnuts. The indication that it was an acid the birds were using was obtained when one of the English walnut hulls was cut open and litmus paper quickly placed against it; the paper instantly gave a strong acid reaction.—MARY EMMA GROVE, *Charles Road, Lancaster, Pennsylvania*, and HERVEY BRACKBILL, *4608 Springdale Avenue, Baltimore, 7, Maryland*.

Chipping Sparrow's nest without hair lining.—In the vicinity of New York City, especially in suburban areas, there has been a marked decrease in nesting Chipping Sparrows (*Spizella passerina*) in the last 30 years, possibly correlated with the decreasing availability of horsehair with which they used almost invariably to line their nests. In this connection a 1945 Chipping Sparrow nest from Millwood, N. Y., brought to the writer by Dr. Libbie Hyman, is of interest. It is normal, of fine twigs, dried grasses and what appear to be rootlets, but there is no differentiable lining, or trace of hair in its interior, which is of material similar in character to that of the rest of the nest only finer, more exclusively of the 'rootlets,' and more smoothly moulded. The nest, which is very frail though deep, was sheltered on a flat area in

the dead top of a small pine tree about ten feet high. It had held only two young, in August—a late brood.

Certain warblers that at times use a hair lining for their nests obviously substitute it for hair-like black 'moss-stems' (Auk, 36: 226-227, 1919), but this nest gives no clue as to how the Chipping Sparrow acquired its hair-lining habit, which was so universal when horsehair was readily available.—J. T. NICHOLS, *American Museum of Natural History, New York, N. Y.*

Death of a Trumpeter Swan from multiple parasitism.—The current interest in the Trumpeter Swan (*Cygnus buccinator* Richardson) and its management has served to increase the awareness of waterfowl biologists to the almost complete lack of information concerning the causes of natural mortality in this species. In view of this lack it seems worth while putting on record the results of the examinations of two of these swans that were forwarded to our laboratory during the early spring of 1945.

On February 28, 1945, a sick swan was found wandering along the railroad track near Vanderhoof, B. C. The game warden of the district captured the bird and forwarded it to Vancouver. Despite the best of care it died two days after capture and was sent to me by the B. C. Game Commission.

This bird, an adult female, measuring 58 inches in total length, was extremely emaciated and weighed just eleven pounds. This is less than half the weight of a bird in good health.

Examination for parasites revealed that the small intestine contained 952 tapeworms (452 mature and 500 immature). Dr. A. McIntosh of the Zoological Division, United States Department of Agriculture Bureau of Animal Industry, who identified the parasites from this swan, finds the tapeworms to represent an apparently undescribed species of *Hymenolepis*.

In the caecum were 12 trematodes representing three genera. Six were *Zygocotyle lunatum* (Diesing, 1835), a widely distributed species occurring in ruminant mammals as well as in birds (Caballero, 1940); five were *Echinostomum revolutum* (Froelich), a fluke we have found to be widely distributed in British Columbia in birds feeding upon marsh vegetation, pond snails and lesser vertebrates; one was *Orchipedium tracheicola* (Braun, 1901). The latter, described from specimens removed from the trachea of the White-winged Scoter, *Oidemia fusca*, of Europe, was not again found until Cheatum (1938) reported specimens from the respiratory tract of a White-winged Scoter from eastern North America. This is apparently the first recorded occurrence in a Trumpeter Swan.

The pericardial cavity contained about 30 cc. of brownish fluid. The heart muscle was pale and flabby and had imbedded in it 25 filarial worms of the species *Sarconema eurycerca* Wehr, 1939. Blood smears revealed no haematozoa but large numbers of microfilaria were present. These were presumed to be the larvae of *Eurycerca*. This parasite was described by Wehr (1939) from specimens taken from the heart muscle of Whistling Swans (*Cygnus columbianus*) in Washington, D. C., Wisconsin and Utah. The present record seems to be the first for the Trumpeter Swan.

This swan had succumbed to gross multiple parasitism. Both the cestode *Hymenolepis* and the filarial nematode *Eurycerca* were present in numbers apparently sufficient to induce pathological changes in the host and it is not possible to determine in this case which of the two was most harmful.

On March 13, 1945, an adult female Trumpeter Swan, one of a group of four wintering at Qualicum, V. I., B. C., was found dead. Another of the four gave evidence of illness. The dead bird weighed 16 lbs. and was moderately emaciated.

The white swan-louse, *Ornithobius cygni*, was abundant upon its plumage. There were no parasites in the digestive tract and but three specimens of *Eurycerca* in the heart muscle. Some thirty pellets of lead shot in the gizzard, many of them eroded almost away, pointed to lead poisoning as the cause of death.

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I. McT. COWAN, Department of Zoology, University of British Columbia, Vancouver, B. C.

A white Fish Crow.—This past October (1945) the zoological park was informed by telephone that a white crow had been seen in the vicinity of Ardmore, Maryland. Ardmore is a small village about ten miles northeast of the District of Columbia. I immediately went to the locality of the reported bird and talked with the owner of the property upon which the bird had been seen. I walked around the area and found the bird perched upon the terminal branch of a Virginia pine. It flew to a near-by tree and through my binoculars appeared to be a total albino specimen. By its manner of flight and call (the voice had a nasal pitch, a hoarse *car*, as if it talked through its nose) I identified the bird as a Fish Crow (*Corvus ossifragus*). Albinism is not infrequent among birds and may occur in any species. However, it is rarely complete but more frequently affects only a part of the plumage, when it is usually symmetrical; that is, if a feather in one wing be white the corresponding feather in the other wing will also be white.—MALCOLM DAVIS, *The National Zoological Park, Washington, D. C.*

Albino Robin at Crawfordsville, Indiana.—On October 1, 1945, a partially albino Robin was observed on the campus of Wabash College. When first seen, the bird was on the ground, a member of a flock of feeding birds. When it flew to a near-by low tree, its peculiar pigmentation was striking to the eye.

The feathers of the entire back and wings were predominantly white, but mixed with a few normally pigmented feathers. The upper surface of the tail appeared white, yet when the tail was spread in flight, it was seen that two or three of the rectrices were dark. The entire head was pigmented normally for a robin. The eyes were not pink. The flanks were pure white. The breast was a peculiar mixture of white with splotches of light orange coloration. The legs and feet seemed to be normally pigmented.

This partial albino was observed for several minutes both on the ground and in near-by trees. It stood out in marked contrast to the other birds, although its peculiar color did not seem to affect in any way its social behavior as a member of the flock. At one time the Robin flew into a tree and was observed within a few feet of a Black-throated Green Warbler. It seemed to the observer that all the hues of the spectrum were reflected in the feathers of these two highly colorful birds.

It is of interest to note that during August one of my students reported an albino Robin on our campus. Undoubtedly, this is the same bird which, therefore, had been

in Crawfordsville for several months.—HOWARD H. VOGEL, JR., *Dept. of Zoology, Wabash College, Crawfordsville, Louisiana.*

Unusual nesting of the Prothonotary Warbler.—On May 28, 1939, I was shown the nest of a Prothonotary Warbler (*Protonotaria citrea*) near Gumboro, Sussex County, Delaware, placed in an open central fork of a small hop hornbeam or ironwood tree (*Ostrya virginica*) six inches in diameter. The nest was six feet from the ground. It was constructed of grasses, parts of leaves, and fine shreds of bark, and was three and one-half inches in diameter and four inches deep. Judging from the appearance of the nest and the material of which it was composed, I believe that it was built the year before.

I approached the nest quietly, and from beneath I could see nothing on the nest. When I moved my hand toward it, however, a bird flew off and perched on a bush a few feet away where I identified it as a female Prothonotary Warbler. The nest contained five typical eggs of the species.

From a fairly extensive perusal of the literature, it appears that the closest approach to nesting in an exposed nest is that described by Wright and Harper (Auk, 30: 500, 1913): "In each case (4) the nests were not in deep holes with narrow openings, but in open cavities where the eggs or young could be plainly seen."

We are unable to say that the nest in question was built by the Prothonotary Warbler, but the bird was at least using it. That such was the case is of interest because it is so at variance with the usual habit of nesting in a more or less closed cavity.—ALBERT E. CONWAY, *Dept. of Biological Sciences, Drexel Institute of Technology, Philadelphia, Pennsylvania.*

Acorn storing by *Balanosphyra formicivora* in Panamá.—In late July, 1945, I spent a few days in the beautiful El Volcán region of Panamá (Chiriquí Province) at an altitude of about 5,200 feet. An automobile highway has been under construction for some time and small planters have burned over, for maize growing, considerable land immediately adjacent to the road, leaving many dead trees. As a result woodpeckers are much in evidence, and the Streaked-cheated Woodpecker, *Balanosphyra formicivora striatipictus*, is particularly numerous. In view of the report by van Rossem that he found no evidence of the storing of acorns by woodpeckers of this species in El Salvador, as is done by the representatives in the United States (Field Mus. Nat. Hist., Zool. Ser., 23: 317, 1938), the opportunity seemed favorable to determine whether the Panamá race was entitled to be called an acorn-storing woodpecker. I had no difficulty in finding a stub decorated with the characteristic acorn-filled borings and I watched one bird in the process of inserting an acorn.—EUGENE EISENMANN, *Linnaean Society of New York, New York, N. Y.*

Birds aboard ship.—A female Knot, *Calidrus canutus*, in autumn plumage, was collected aboard the Liverpool-bound troopship, S. S. John Walker, on September 9, 1945. Location: 22° 15' N.; 50° 12' E., about 500 miles due south of the tip of Ireland. On the preceding two days, winds were 6 and 7 force. The bird was obviously fatigued and was collected by dropping a mattress on it. The stomach was tightly contracted and empty save for a few dark specks.

At 1200, on October 1, 1945, aboard the same ship, Boston-bound, a Golden Crowned Sparrow, *Zonotrichia coronata*, was observed. Location: 42° 34' N.; 54° 48' W., three days out of Boston. Although it was noticeably fatigued, attempts to capture it were unsuccessful. It left the deck at 1230 and when last seen was flying almost due west ahead of the ship and undulating ten to fifteen feet above the crests of the waves.—LT. THANE A. RINNEY, *Trans. Serv. Pier 2, Brooklyn 20, N. Y.*

The White-faced Storm Petrel off Cape Cod.—On October 1, 1945, I was aboard the Victory ship 'Claymont Victory' which was one day out of New York harbor returning servicemen to the United States for redeployment. At 0730 hours I went up on deck to watch for ocean birds at which time the ship was approximately 30 miles off the tip of Cape Cod, Massachusetts.

Small scattered flocks of Leach's and Wilson's Storm Petrels darted erratically along the troughs of the waves on either side of the ship, some as close as twenty yards from the vessel. I was watching a Wilson's Petrel about 25 yards off the starboard side through 8x glasses when a black and white petrel flew into my field of vision about five yards beyond the Wilson's. The newcomer was fluttering along in the same direction as the ship and remained under observation at a distance of about thirty yards for nearly three minutes. This petrel appeared to be slightly larger than the Wilson's and was dark above, blackest on the primaries, secondaries and tail, and white below including the forehead, chin, throat and under wing-coverts. The rump was paler than the back but not brilliant white. In flight this petrel was much slower and more butterfly-like than either the Wilson's or Leach's and several times fluttered over bits of flotsam but did not pick up anything. The White-faced Storm Petrel (*Pelagodroma marina*) is the only storm petrel with the under surface entirely white. It breeds in the Canary, Salvage and Cape Verde islands in the South Atlantic and has been recorded only twice, to my knowledge, off the coast of eastern North America. A specimen was collected at sea off the coast of Massachusetts in 1885 and the record was published in the October Auk of that year. The A. O. U. Check-List cites one record 400 miles off the coast of New Jersey.—JACKSON MILES ABBOTT, CAPT., CE, U. S. A., *Whitehall Hotel, Haverford, Pennsylvania*.

Summer occurrence of the White-winged Scoter on National Wildlife Refuges.—Since a review of the literature has revealed a scarcity of records of the summer occurrence of the White-winged Scoter (*Melanitta deglandi*) in the Great Plains region, the following observations made by several managers of National Wildlife Refuges located in this area are presented:

Six birds spent the summer on Lake 12 of the Medicine Lake National Wildlife Refuge, Roosevelt and Sheridan counties, Montana, thus establishing a new record for the refuge and adding another to the very few summer records for the state (B. M. Hazeltine). The species was again noted here in 1944 when 12 birds returned May 18 to summer on Lake 12. The last observation for that year was of four birds, October 20 (Vernon Ekedahl).

Previous to the summer of 1940, when a pair of White-winged Scoters remained on the Upper Des Lacs Lake, only migrant birds had been seen on the Des Lacs Refuge, Burke and Ward counties, North Dakota (Seth Low). During a census made here June 14, 1941, seven males were identified but no females were found (F. V. Kent). A single bird, possibly a straggler, was noted on the Upper Thompson Lake of the Lostwood Refuge, Burke and Mountrail counties, North Dakota, June 2, 1938 (Seth Low).

While salvaging ducks from drying water areas in the vicinity of the Lower Souris Refuge, Bottineau and McHenry counties, North Dakota, July 28, 1936, Seth Low found two broods of nine young each, on a deep little lake about five miles south of Denbigh, North Dakota. Observations of four birds on the Upper Souris Refuge, Renville and Ward counties, North Dakota, June 6, 1936 (P. N. Chase) and a similar number June 19, 1940 (F. S. Dart) constitute the only summer records of the White-

winged Scoter for this refuge.—FAXON W. COOK, *Fish and Wildlife Service, Chicago, Illinois.*

Western Grebe in Keuka Lake at Branchport, N. Y.—At 4:30 P. M. on April 23, 1942, I was searching the lake with my high-power telescope, looking for ducks, when a Western Grebe came into its field. Swimming along with its very long swan-like neck held erect, its size, carriage and the all black and white plumage—black crown and black stripe down the back of the neck to the black back—it was unmistakable. I had it under observation for ten minutes or more before it passed out of range. At 7:00 next morning I saw it in about the same place, but had to leave soon to get to my work and did not see it again.

There seem to be no western New York records for this species and until now I have hesitated to publish this. Now, after reading Mr. Packard's record of the Western Grebe in the Auk (62: 461, July, 1945) and being absolutely sure of my identification, I feel that this later record should be published.—VERDI BURTCH, *Branchport, New York.*

Little Blue Heron at Branchport, N. Y.—August 6, 1944. This morning I found a Little Blue Heron in a beaver pond two miles up the inlet of Keuka Lake. It was a young bird in the white plumage and I watched it for more than an hour. I do not think that it was aware of my presence until I began to move up cautiously; then it climbed up on a dead bush and soon flew off up the creek. A little later in the day, Charles Spiker and Carlton Sturdevant were at the locality and both saw it. I visited the pond several times on succeeding days but did not see it again.—VERDI BURTCH, *Branchport, New York.*

King Rail at Branchport, N. Y.—Late in the afternoon of August 31, 1941, in company with my daughter, Mrs. Vireo Whitaker, and Chas. Spiker and Carlton Sturdevant, I was sitting on a small boat dock on Keuka Lake. The shore here is bordered with a growth of cattails and at this time the low water had left a narrow muddy shore line. While we were watching two Solitary Sandpipers, two rails came out of the cattails several rods down the shore and began hunting. At first I thought they were Virginia Rails, but they appeared much larger and I was suddenly aware that I was looking at two King Rails, the second time that I had ever seen one in life. They were an adult and juvenile and as they approached, the adult picked something up and came running toward us, with the young one following closely, until they were both within 60 feet of us. They did not appear shy and we watched them for some time as they searched the muddy shore.

That evening I brought one of my one-funnel bird traps down and set it where we had seen the rails. Next morning the two birds were seen but the trap was empty. At 2:00 P. M. I was there again, but the trap was empty and no rails were in sight. I sat down on the dock and in a few minutes the young one came out, walked toward and went on past the trap. Then it turned, went back, and without hesitation walked directly into the trap. I placed band No. 40-515596 on its right leg and carefully noted its plumage. The crown and back of neck were dark gray, almost black; back brownish gray-black with gray-olive margins to the feathers; neck grayish-white with many chestnut streaks; sides and flanks brownish gray with white bars; legs olive-gray; bill brownish black. This bird was seen again September 2, 7, 10 and 14. This was the last time. The adult was not seen again until the afternoon of September 28 when I found it far out in the open on the mud flats some 50 or 60 rods to the north of where I had seen the birds before. When it saw me it ran and flew back to the cattails into which it disappeared. This was the last time either of them was seen.—VERDI BURTCH, *Branchport, New York.*

Parasitic Jaeger at Branchport, N. Y.—The morning of May 13, 1945, Mr. and Mrs. Edgar Bingham, Mrs. Vireo Whitaker, Miss Hazel Ellis, and myself were in the field below my house looking out over the lake to watch the ducks, gulls, loons, grebes and other birds, when we saw flying towards us, from over the lake, nine large, dark-colored birds that were about the size of a Ring-billed Gull. They passed almost directly over us, flying northwestwardly towards Canandaigua Lake. They had long, narrow and pointed wings and appeared almost black in the dull light. The middle tail feathers were very conspicuous, extending several inches beyond the rest of the tail. None of us had ever seen such birds before. While we were excitedly talking and wondering what they could be, seven more just like them came and passed on in the same direction, being followed by five more, making twenty-one in all. I thought they might be jaegers and a check-up with my books convinced all of us that they were Parasitic Jaegers. There seem to be only four to six records of this bird for western New York.—VERDI BURTON, *Branchport, New York*.

Duck Hawk nesting in Colorado.—Although there are several published reports of the Duck Hawk (*Falco peregrinus anatum*) nesting in Colorado, the evidence has not been convincing. Cooke (Birds of Colorado, 1897) reported that W. P. Lowe found a nest with young in St. Charles Canyon near Pueblo in 1895, and that Gale had taken a set of eggs on the Cache la Poudre River in 1889. It has been shown that Lowe was not too reliable an observer, and Sclater (A History of the Birds of Colorado, 1912) states that the eggs Gale collected were Prairie Falcon's. The only other account of the species breeding seems to be Sclater's (1912), apparently on the authority of Aiken, that a pair nested in the Garden of the Gods for five years. An adult female in the Colorado College Museum, taken in the Garden of the Gods on June 18, 1884, would tend to indicate that the birds were nesting.

Various reports of Duck Hawks breeding in Colorado in recent years have been received by us, but all have proved erroneous except one. Mr. Hoyt Miller of Durango, Colorado, wrote us in the summer of 1943 that Duck Hawks had a nest on Chimney Rock in Archuleta County. Mr. Miller was fire warden at the station on the rock, and at our request he shot an immature male and sent it to the Museum (C. M. N. H. no. 23612). On comparing it with fall migrants, we found it much darker than the northern birds, which would tend to support a suspicion we have had that the Duck Hawks of the northern part of the continent differ subspecifically from those of the southern.

We visited Chimney Rock, the most conspicuous landmark between Pagosa Springs and Durango, on August 20 and made a few movies of the adults and young in flight. Mr. Miller had jotted down notes regarding the birds from which we have taken the following:

Chimney Rock, high over the Piedra River, is a fire lookout about thirty-five miles east of Durango. When he arrived at the station on June 5, the female was incubating; on June 22 she was seen carrying food to the nest, and three days later, cries of the babies could be heard. When the young were large, they stood on the ledge and flapped their wings, occasionally rising into the air. They made short flights July 8, but remained close to the nest, though the female would circle by as though to get them to follow.

The adults were belligerent, chasing all birds out of the territory except the White-throated Swifts. When the young were small, about ten trips a day with food were made—an estimate of three hundred for the month.—ALFRED M. BAILEY AND ROBERT J. NIEDRACH, *The Colorado Museum of Natural History, Denver, Colorado*.

The winter range of the Great Blue Heron.—The fourth (1931) edition of the A. O. U. Check-List gives the winter range of the Great Blue Heron (*Ardea h. herodias*) as "to Florida, Texas and Panama, casually to Colombia and Venezuela." In The Auk for 1932 (49: 457-458), F. C. Lincoln recorded the first known occurrence of this race in Cuba. Since then, five more birds, all banded as immatures well within the breeding range of this form, have been recovered in Cuba, indicating that the bird migrates fairly regularly to that island. In addition, one bird from Michigan has been taken in Jamaica, an apparent extension of the known winter range.

Because of the paucity of information on the winter range of the Great Blue Heron south of the United States it has seemed desirable to include here the known recoveries from Middle America, all banded as immatures.

No. 320371, banded at Hat Island, Green Bay, Wisconsin, July 18, 1931, by W. I. Lyon, was killed February 9, 1932, at Candelaria, Pinar del Río, Cuba.

No. A 717307, banded at Spider Island, Door Co., Wisconsin, June 30, 1933, by W. I. Lyon, was killed about July 1, 1934, at Mendoza, Pinar del Río, Cuba.

No. 36-718048, banded at Hat Island, Lake Huron, Michigan, July 1, 1936, by F. E. and C. C. Ludwig, was killed January 11, 1938, near Pinar del Río, Cuba.

No. 38-728213, banded on Otter Island, Muscongus Bay, Maine, June 22, 1939, by J. M. Cadbury, was found dead January 18, 1940, at Central Violeta, Camaguey, Cuba.

No. 38-728270, banded at Otter Island, Muscongus Bay, Maine, July 3, 1940, by J. M. Cadbury, was killed by striking electric wires, December 3, 1940, at Bayamo, Oriente, Cuba.

No. 38-804248, banded near Earleville, Maryland, May 21, 1939, by J. A. Gillespie, was (probably) found dead December 25, 1939, at El Stabo, Matanzas, Cuba.

No. 38-724101, banded in Erie Township, Monroe Co., Michigan, June 18, 1938, by L. W. Campbell, was shot January 1, 1939, at Windsor, Jamaica.

No. 334487, banded at Waseca, Minnesota, June 5, 1925, by E. A. Everett, was found wounded February 21, 1926, at El Hule, Oaxaca, México.

No. 34-705490, banded at Imperial Beach, Saskatchewan, July 5, 1936, by Fred G. Bard, was killed January 24, 1938, at Lake Tamiahua, near Tampico, Tamaulipas, México.

No. 36-714845, banded near Medford, Taylor Co., Wisconsin, June 19, 1938, by G. G. Ruesch, was killed about December 22, 1938, at Tekit, Yucatán, México.

No. B 665787, banded at St. Johns, Michigan, May 21, 1933, by Lawrence Ward, was shot February 29, 1936, at Corozal, British Honduras.

No. 34-632334, banded at Depue, Illinois, June 21, 1936, by Karl E. Bartel, was shot November 30, 1936, at Monkey River, British Honduras.

No. 36-808144, banded at Hog Is., Door Co., Wisconsin, June 25, 1937, by William I. Lyon, was shot in November, 1937, at Belize, British Honduras.

No. 36-715848, banded at Dupue, Bureau Co., Illinois, June 27, 1937, by Karl E. Bartel, was "found" about March 27, 1945, near Coatepeque, Quezaltenango, Guatemala.

No. 40-719115, banded on Hat Island, Beaver Islands, Lake Michigan, July 3, 1940, by F. E. and C. C. Ludwig, was killed by a hawk about January 2, 1943, on the Río Coco, Nicaragua, near Bocay, about 200 miles from the east coast.

No. 334402, banded at Waseca, Minnesota, May 23, 1925, by E. A. Everett, was killed in September, 1925, at Gatún, Panamá.—MAY THACHER COOKE, *U. S. Fish and Wildlife Service, Washington, D. C.*

Sage Thrasher in southeastern Texas.—On October 17, 1945, while I was driving a car at Cove, Chambers County, Texas, I saw a dark bird with a white tail-band fly from one bush to another beside the road. I stopped the car and got out, and saw, about fifteen feet from me, a very small and light-backed thrasher with a shorter tail than a Brown Thrasher's. Presently the bird flew past me and alighted on a fence about fifty feet away. The white on its tail showed plainly. I walked up to within fifteen feet of it once more, whereupon it flew away to a distance of about fifty feet, where I again observed it carefully. Its back was lighter and duller than a Brown Thrasher's, and its wing bars less distinct. There could be no doubt that it was a Sage Thrasher. Dr. Harry C. Oberholser states that, except for five individuals seen in Cameron Parish, Louisiana, on January 2, 1926, the bird I saw supplies the easternmost record of the species.—A. K. MCKAY, Cove, Texas.

Jaçana taken at sea.—I received from my son William, who is in the Merchant Marine, a nice skin of a Jaçana (*Jacana spinosa*). The exhausted bird landed on his ship on August 11, 1945, off the coast of Dutch Guiana, latitude 6° 40' N. and longitude 55° 46' W., 42 miles from the nearest land. The weather was not abnormal at the time. Since this species is not known to migrate, its occurrence at sea must be considered accidental.—A. W. SCHORGER, 168 N. Prospect Avenue, Madison, Wisconsin.

The Florida Blue Jay at Sarasota, Florida.—This subspecies (*Cyanocitta cristata cristata*) was common at Sarasota, Sarasota County, Florida, during the late winter seasons of 1943 and 1944. Two were closely observed on our bedroom window feeding shelf February 9, 1943, and two to four came there regularly until mid-April; then one appeared on February 1 and two were recorded March 22, 1944. My later notes read: "Daily now." None came to feed in 1945. This bird was seen regularly at three to six feet. It appeared larger, brighter blue, and lighter colored below than Semple's Blue Jay (*Cyanocitta cristata semplei*), the supposed resident subspecies in this locality. In life the latter is darker grayish blue above and the sides of breast a trifle deeper smoky shade. This does not agree exactly with the book description which perhaps was made from dead birds or dried skins.

The above records seem to extend the known range of *C. cristata* (= "*florincola*") southward, and indicate that the two subspecies spend some of the winter and spring months, at least, in the same habitat. Sarasota is about eighty miles south of Tarpon Springs in a direct line, and Hillsborough and Sarasota counties are separated by Manatee County. The 1931 A. O. U. Check-List gives the range of the Florida Blue Jay as northern Florida and that of *semplei* as the central and southern parts of the state. Mr. Arthur H. Howell, in his work on Florida birds, indicates the separating line of the two subspecies as Hillsborough County west and Osceola County east, or about south of the towns of Tarpon Springs on the Gulf Coast and Melbourne on the Atlantic side, and thence southward to Key West. I notice that he examined specimens of *semplei* from Tarpon Springs.

Perhaps the more northern form observed here was making a migratory movement southward but lingered into the spring on account of finding a bountiful supply of good food. The jays seem to be especially fond of raw cut peanuts. I think it would be difficult to distinguish *cristata* from *semplei* in trees or bushes at an ordinary distance unless the two kinds happened to be near together and in good light. The latter is common here and both forms seem to remain paired during the winter season. At present—December, 1945—two Semple's Blue Jays, presumably a pair, come regularly to feed together. They arrive at the shelf about one hour after daylight,

having no competition at this time. Later, when the grackles, woodpeckers, and other birds commence to feed, the jays come at the break of dawn. We often have as many as eight of the last at one time. The larger jays seem to realize their physical superiority, frequently driving the smaller form away from the food.

My wife was able to separate the two subspecies, as she would often tell me which and how many of each were on the shelf eating when I was unable to watch them. I have studied the skins of both varieties.

We went north May 7, 1943 and May 12, 1944. After these dates, three jay's nests were built in our small back yard citrus grove. I assume these nests were constructed by *semplei* but it would be interesting to have the proof.—CHARLES L. PHILLIPS, 236 Oak St., Sarasota, Florida.

A spring record for the Arkansas Kingbird in southern Mississippi.—On May 6, 1945, while I was passing a partially overgrown field three miles north of Gulfport, an Arkansas Kingbird (*Tyrannus verticalis*) was observed in the top of a large bush a short distance from the road. After verifying its identity with my binoculars I left the car with my gun, anticipating no difficulty in collecting it, but the bird immediately flew, circled overhead, and then was almost at once out of sight, flying slightly south by west. During eight years of intensive field work on the Mississippi Gulf Coast I found the Arkansas Kingbird of casual occurrence as a fall transient (Occas. Papers Mus. Zool., La. State Univ., 20: 399, 1944), but this is the first instance in which I have noted this species in the spring. This is apparently also the first spring record for the state.—THOS. D. BURLIGH, Fish and Wildlife Service, Atlanta, Georgia.

Lark Bunting records for Ohio.—On August 6, 1945, Clyde Wheeler and the writer were inspecting legume seedings in Henry County, Ohio. About five miles northwest of Deshler, we got a momentary glimpse of two Lark Buntings (*Calamospiza melanocorys*). Returning the next day with collecting equipment, we could find no trace of them. After searching nine hours, we finally located the birds in a small aspen thicket on an adjoining farm. The bird collected, a second-year male, is now in the Ohio State Museum collection. It was in worn plumage with molting of some of the head feathers in progress. The testes were so small the bird could hardly have bred in 1945. The secondaries and all but the four outer (black) primaries and their coverts, as well as the central pair of tail feathers, were brown.

The taking of this specimen was preceded by several sight records in the same general area. Robert H. McCormick and the writer spent the night of July 27, 1930, at Napoleon, in Henry County, while making Ohio wild life surveys. The next morning, while on an early bird trip along the Maumee River just east of town, we saw a flock of seven dark birds with white wings. Notes taken at the time well describe the Lark Bunting.

During August, 1934, following one of the dust storms which swept through the East as an effect of the drouth cycle, a farmer living in Plain Church Township, Wood County, reported "bobolinks with white in the wrong place" which behaved strangely. These birds remained several days but were gone before I could locate them for positive identification.

In early August, 1937, a farm boy living in eastern Henry County, who had observed flocks of Snow Buntings at a distance the previous winter while assisting the writer in game-bird censuses, wrote of seeing "some more of those white-winged birds." On August 9, 1937, when I was able to visit his home in northern Jerusalem Township, three Lark Buntings were found. "Several times as many" were reported

to have been present the week before. These birds evaded collection by flying low over a large corn field and could not be found again.

Why have these waifs from the west turned up on at least four occasions during the last 15 years in a 20-mile-long strip of dry prairie-lake plain in northwestern Ohio? There have been a number of other reports from eastern states during the same period but the only other Ohio record is of a juvenile male found dead on September 6, 1944, by Merit B. Skaggs, near Cleveland (Auk, 62: 313, 1945). The five records all fall during a 40-day period in late summer (July 28 to September 6).—LAWRENCE E. HICKS, *Ohio State University, Columbus, Ohio.*

Additional notes on the Arkansas Kingbird in Luce County, Michigan.—Since sending in my date of observing the Arkansas Kingbird (*Tyrannus verticalis*), which appears in Dr. Josselyn Van Tyne's list of Michigan records of this species (Auk, 50: 107, 108, Jan., 1933), I have seen this species on nine more dates. These are: September 20, 21, 22, 25, 26, 27, 28 and 30, and October 1, 1945. Only one bird was seen on each day, and as all observations were within a small area, it seems certain that it was the same bird. It was first noted in a lane on the place where I formerly resided, two miles south and between one-half and three-fourths of a mile east of McMillan, Luce County, Michigan, and it was very near the same place on the next two days. On September 30, it was on a fence by a corn field not over 50 feet from the east side of a large area of hardwood forest. This is the nearest to any woodland that I observed it. On each of the other five days, it was seen at various places about the farmyard. The entire area is not over 40 rods north and south, and 70 rods east and west. The bright yellow on the breast and some of the other under parts and the light-colored head and neck were among the chief field marks used in identification.

This bird encountered most unfavorable conditions for capturing insects on the wing during the time it was at this locality. The first two days were the best, with fair weather and a temperature ranging from 32° to 61° F. From September 22 to 28 there were snow storms and cold weather so that very few if any insects were flying about. Snow fell on each of these days, covering the ground at times, but usually gone by sundown. Rain also fell on each of these seven days, except the 27th, and the temperature ranged from as low as 25° F. on the 25th to as high as 49° on the 23rd. On three of these days, I did not see the temperature above the 30's. September 29 was mostly cloudy and cold (35° to 43°). On one day of this cold period, September 27, I was fortunate in seeing the kingbird feeding on mountain ash berries on a tree in the yard; it took at least two berries. It would be of interest to know to what extent this wild fruit served for food for this bird when flying insects were scarce. Natural feeding conditions were very much better on the last two days (September 30, October 1), when fair weather prevailed and the temperature ranged from 36° to 67° F.

Readers may note that this bird was last seen on a day when natural feeding conditions were favorable. It remains a mystery to me why it remained at this locality during unfavorable weather and at a time which seems to be unusually late for this species in the northern part of its range, judging by Mr. A. C. Bent in his "Life Histories of North American Flycatchers, Larks, Swallows and Their Allies" (U. S. National Museum Bulletin No. 179: 69, 1942).—OSCAR MCKINLEY BRYENS, *Three Rivers, St. Joseph County, Michigan.*

Migration of the Sooty Shearwater off the Washington coast.—On September 2, 1945, Earl J. Larrison, Jr. and I observed a large migration of the Sooty

Shearwater (*Puffinus griseus*) at Gray's Harbor, near Freeport, on the coast of Washington. There is a long breakwater extending about two and one-half miles out into the ocean at this point, and the birds were flying south just beyond its end.

For an hour, during the walk out to the end of the rocky breakwater, we had seen enormous flocks of shearwaters, and, when we reached the end, we watched them for an hour or more. We attempted to estimate the number of birds by counting the number passing a point about one hundred yards distant in a given time period. In this way, it was believed that about 100,000 birds an hour were going by. Most of them flew close to the surface, but individual birds regularly wheeled up to a height of about 50 feet from time to time, staying here for about twenty seconds, and then rejoining the main flock. We were told by some fishermen that the flock had been passing steadily for about three days, so that an estimated count of several million birds does not seem to be excessive.

At one time, toward evening, the leaders of the flock turned east into Gray's Harbor, and thousands of birds followed them, circling about and finally settling on the water in a dense, compact mass which covered several acres of water surface. In this flock was one bird, noticeably larger than the Sooty Shearwaters, with clear white under parts—probably the Pink-footed Shearwater (*Puffinus creatopus*). On the way back we picked up one dead Sooty Shearwater which had been killed by a car.—DR. LOCKE L. MACKENZIE, *New York City*.

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Lesser Black-backed Gull in New York harbor.—On the evening of March 28, 1945, while the boat on which I had crossed the Atlantic from England was lying off Staten Island, I saw a Lesser Black-backed Gull among the crowds of Herring Gulls. The bird flew past me, and rather below me, at a distance of a few yards. Not only could I see that its size was the same as that of the Herring Gulls, but I also saw the yellow legs, while the mantle was not by any means as dark as that of the Greater Black-backs that were also flying up and down the Hudson River that afternoon. In terms of the subspecies to be seen on the eastern side of the Atlantic, I should have supposed it was *Larus fuscus graellsii* rather than *L. f. fuscus*, but there are probably other possible subspecies that should be taken into account as possible visitors to New York. On the following morning (26th) before we weighed anchor, the bird once again flew past our boat, but I did not see it so well as on the previous evening.—H. G. ALEXANDER, 144 Oak Tree Lane, Birmingham 29, England.

Rare Utah birds.—In going over my collection recently with Dr. A. M. Woodbury of the University of Utah, we came upon a swift that I have for years been holding for comparative data. The University had comparative skins, and it has been finally identified as the Chimney Swift (*Chaetura pelagica*), taken by me at Kaysville, Utah, May 7, 1912. This is a new record for Utah, and the specimen has been donated to the collection of the University of Utah.

I have also given to the University of Utah the Roseate Spoonbill (*Ajaia ajaja*) recorded by me from Wendover, Utah, July 2, 1919 (Auk, 36: 565, 1919), as it seems to be too rare a bird to be left in a private collection.

On May 27, 1944, on Farmington Bay, Utah, Louise Atkinson and I sat within seventy-five feet of a Brown Pelican for half an hour and were able to record every detail of its plumage. Shooting was not allowed. I have submitted the detailed description to various ornithologists and, although its size indicated *Pelecanus occidentalis occidentalis*, we have concluded to call it just "Brown Pelican." Dr. A. M. Woodbury has one sight record for *P. o. californicus* for Utah (Condor, 39: 225, 1937), but as far as I know these two comprise all the records of the occurrence of the

Brown Pelican in Utah.—CLAUDE T. BARNES, 359 Tenth Avenue, Salt Lake City, Utah.

Roseate Spoonbill nesting on the Sabine Refuge, Louisiana.—The Sabine National Wildlife Refuge, lying between Calcasieu and Sabine lakes in Cameron Parish, Louisiana, was acquired primarily as a water-fowl refuge to protect the huge flocks of Blue and Snow Geese wintering in that locality. In addition to fulfilling its original purpose, this 142,000-acre refuge shelters many other forms of wild life, among them the rare Roseate Spoonbill (*Ajaia ajaja*).

The earliest records of the Roseate Spoonbill on the Refuge date from 1938, the year the area was placed under management. Field reports indicate that small numbers occurred during the summer, with a few being seen in the spring and fall months. For many years the spoonbill had maintained a relatively permanent rookery on Bird Island in the Black Bayou area, Cameron Parish, a few miles north of the Sabine Refuge boundary (R. P. Allen, Nat. Aud. Soc. Research Report, No. 2, 1942). E. L. Atwood, a former manager of the Sabine Refuge, made an inspection of Bird Island in 1942, but found no evidence of nesting. The serious implication of this finding is obvious when it is remembered that the Bird Island rookery then was the only known nesting colony of this species in Louisiana and one of a very few remaining in the United States.

In the spring of 1943, Refuge Manager V. L. Childs found spoonbills congregating on Bird Island and it appeared that they were preparing to nest; later a marsh fire burned over the island and caused the birds to leave; in early May they made their appearance on the Refuge at Shell Island, a small man-made mound of less than an acre in extent, covered by small trees and shrubs, lying approximately 15 miles southeast of the old rookery on Bird Island. On May 25, John Lynch and Roland C. Clement visited Shell Island and counted 73 adult birds. By the end of May nesting was in full swing and it was estimated that 35 pairs were using the new location. A severe thunderstorm on May 24 damaged many nests and not more than 18 young birds matured.

Some 400 adult egrets, herons, spoonbills, and cormorants used this small nesting site in 1943. The limited tree and shrub growth was completely utilized, but the variations in nesting periods and heights tended to relieve the competition for nest sites. When incubation by the American and Snowy Egrets was well advanced, and the cormorant and Ward's Heron rookeries were breaking up, the spoonbills were just beginning to build nests. The Ward's Heron placed its nests at a higher level than the other species, using the tops of the trees and even the 20-foot lookout tower; the tallest trees present are estimated to be not more than 40 feet high. The cormorants nested from eight feet above the ground to the tops of the smaller trees, while the American Egret's nests were found at levels between four and ten feet. The spoonbill nests were rather uniformly placed at approximately seven feet above the ground, and the Snowy Egret did not appear to have any height preference, building its nests from almost level ground to 35 feet.

No spoonbills were observed from the last of August, 1943, until April 25, 1944, when Mr. Childs saw 14 adults. By the end of May, 20 pairs were present on Shell Island and the population continued to increase until July 11 when this same observer counted 200 adults; in addition, 75 were seen along the boat channel en route to the island. A complete census was not attempted because it would have caused undesirable disturbance, but it was ascertained by a cursory examination that no fewer than 60 spoonbill nests were located in the rookery, which again was shared with cormorants, egrets, and herons. A late visit on August 19, 1944, disclosed that 11 adults

and 50 young spoonbills in almost complete coats of dull pink yet remained. On the basis of several trips by refuge personnel to Shell Island during 1944, it was determined that approximately 350 adults used the rookery and 150 young spoonbills were produced. Roseate Spoonbills were observed much later than in previous years; Mr. Childs recorded four birds on November 20 and three were reported by a fur trapper December 19, 1944. Spoonbills were also seen on Bird Island in the Black Bayou area that fall, although no nesting had occurred here in 1944.

In 1945, Roseate Spoonbills returned earlier than usual, with nesting under way the last of April. On March 13, Arthur Miller, Regional Refuge Supervisor, and Manager Childs observed some 20 spoonbills and also estimated that 225 nests of the Snowy Egret, Ward's Heron, American Egret, cormorant, and Louisiana Heron were in the Shell Island rookery. By the end of April, approximately 100 spoonbills were present and five nests were seen, but again the inspection was brief to avoid undue disturbance. Several young Roseate Spoonbills were seen in the nests on May 8, 1945, and by June 16 they were strong enough to move about in the trees. Two hundred adults were seen in the vicinity of Shell Island on June 20 when James Silver (Regional Director), William Davis (Regional Game Management Supervisor), and the refuge manager visited the area. On July 19, Refuge Patrolman, George Harrison, counted 42 nests; of these, 12 contained four young; 16, three young; 10 contained two young birds, and 4 had only one each—an average of 2.85 per nest. It was estimated that 80 pairs of spoonbills nested on Shell Island in 1945, and it was evident that they were incubating more eggs this season than last year.

Patrolman Harrison made a trip on July 19, 1945, to the old nesting area on Bird Island, but no Roseate Spoonbills were found. Probably marsh burning and increased human activity have been responsible for the abandonment of the rookery.

The tree growth about Shell Island has been heavily taxed by the high concentration of nesting and some permanent damage has resulted. During the winter of 1944-1945, two nesting platforms were constructed to provide additional sites for the birds. These are about 20 feet long and consist of two decks, both within the range of elevations apparently favored by the spoonbills. The planking is so spaced as to provide a measure of sanitation. While the spoonbills showed no interest in the new structures, other species did find them acceptable. At least 25 nests were built on the platforms by Ward's Herons and American and Snowy Egrets in 1945, and to that extent relieved the pressure on the island's vegetation. Tree plantings have been made in suitable locations on the Refuge with the hope of establishing additional rookery sites.—R. E. GRIFFITH, V. L. CHILDS, and FAXON W. COOK, *Division of Wildlife Refuges, Fish and Wildlife Service, Department of the Interior, Chicago 54, Illinois.*

Predation on living prey by the Black Vulture.—In practically every reference to the food of the Black Vulture (*Catharista urubu*), mention is made that it occasionally attacks such domestic stock as lambs, kids or pigs. However, one cannot but note that specific instances of it are highly infrequent and the comments thereon deal largely in generalities. Aside from the fact that they take young herons from nests in rookeries and tear the eyes from newly born calves and the like, one is hard put to it to find a record of actually witnessed predation of this sort. Therefore, it seems that the following is worthy of record, as it comes from an impeccable source; the observer is a highly trustworthy and completely competent authority. The observation comes to the writer through the kindness of a friend who knows her well.

Miss Serena K. Dandridge maintains a large flock of sheep on a farm near Shepherdstown, West Virginia. One day in July, 1945, she noted that one of the lambs

was without its tail. No one knew why. The day before, the tail was present; the next it was non-existent. A day later, it was noted that both the hind quarters of the same animal bore numerous lacerations. A watch was kept after this with the result that on a succeeding day, three Black Vultures were seen to attack the lamb and "literally tear it to pieces while yet alive." It was added that a fourth vulture "sat on the mother to keep her away." No further elaboration of this sentinel's tactics was given. Apparently, a flock of about 75 of these birds frequents the vicinity of the sheep pasture and a constant watch has to be maintained in order to keep down further depredations.

In Vol. 1 of the Birds of Prey of Bent's 'Life Histories,' J. D. Figgins is quoted as having seen this species tearing the eyes from new-born calves and weakened cows. He also witnessed the attack of a vulture on a small pig and the removal therefrom of the tail. Oscar E. Baynard is quoted as saying that the Black Vulture is destructive to young pigs and lambs in Florida, but C. J. Maynard, on the other hand, states that it is more inclined toward carrion than the Turkey Vulture (*Cathartes aura septentrionalis*) "and will seldom eat fresh meat . . .".

No doubt such instances are, to say the least, uncommon, but definite records of them are so rare that it seems well to set some of them down. The writer has never witnessed it.—ALEXANDER SPRUNT, JR., *The Crescent, Charleston 50, South Carolina.*

Concerning the status of Hutchins's Goose on the Atlantic coast.—While it is usually merely repetitious to list records previously published, the following are mentioned to supplement W. L. McAtee's summary of records of *Branta canadensis hutchinsii* on the Atlantic coast (Auk, 62: 461-462, 1945) and particularly because they are more recent than any which he listed. Witmer Stone ('Bird studies at old Cape May,' 1: 190, 1937) says: "Dr. Henry Tucker tells me that a few years ago he secured one on his place on the Elk River, Maryland." Wharton Huber (Auk, 48: 259, 1931) mentions a specimen, given to the Academy of Natural Sciences of Philadelphia, which was shot on January 31, 1931, on the Bohemia River, Maryland, by Mr. R. R. M. Carpenter.

The A. O. U. Check-List (3rd ed.: 86, 1910) states: ". . . in migration rare east of the Mississippi Valley but recorded on the Atlantic Coast from Maine to Virginia." While it is possible that there are not so many records of this race along the Atlantic coast as there were during the last century, the same is true for nearly all the waterfowl, and I agree with Mr. McAtee that the statement, "Casual on the Atlantic coast (Maryland and North Carolina)," as given in the A. O. U. Check-List (4th ed.: 38, 1931) is too restrictive, and that, in view of the considerable number of records at hand, it should be considered, as formerly, of rare occurrence along the Atlantic coast from Nova Scotia to North Carolina.—ALBERT E. CONWAY, *Dept. of Biological Sciences, Drexel Institute of Technology, Philadelphia, Pennsylvania.*

European Widgeon in eastern Pennsylvania.—In his paper on the status of the European Widgeon (*Mareca penelope*) in North America, Edwin M. Hasbrouck (Auk, 61: 93-104, 1944) contrasts the fall and spring migrations on the Atlantic coast. His "fall and winter" records embrace the period from October 1 to March 31 and, in addition, the first week of April, for he says: "but in the Atlantic Coastal Division there are a few records occurring so early in April—from the 1st to the 7th—that they might rightly be included in the winter list, and they have been so placed." His tabulation shows that on the Atlantic coast, there are 251 records for the "fall and winter" list and 23 records for the "spring and summer" list. He concludes: "The table shows that on the Atlantic coast the bulk of the birds are southbound

migrants . . . ". It is with this point that I wish to take issue, as eastern Pennsylvania is included in this territory, and the records for eastern Pennsylvania do not agree with Mr. Hasbrouck's conclusions.

By arbitrarily placing the limits of the "fall and winter" records so far into the spring migration period, the ratio of fall to spring records has been distorted so as to give the appearance of only a few records on the return flight. The European Widgeon usually associates with the Baldpate (*Mareca americana*), and its appearance in eastern Pennsylvania in spring parallels that of the common species. The Baldpate occurs commonly on its northward migration from March 5 to April 30, with extreme dates ranging from February 26 to May 20. None of the six additional spring records of the European Widgeon listed below nor any of those which Hasbrouck listed for Lake Ontelaunee (4 records, February 26 to May 8, Earle Poole) is earlier than records of the spring migration of Baldpates and, even more significantly, none of the birds was seen during the preceding winter at any of the localities, indicating clearly that these records apply to migrant rather than wintering individuals.

The following records, not listed by Mr. Hasbrouck, bring to eleven the total of properly documented records for eastern Pennsylvania:

March, 1887, one shot on the Delaware River near Chester, by Charles Voelker (Stone, 'Birds of e. Pa. and N. J.': 55, 1894).

March 25, 1908, one shot at West Fairview, Cumberland County, on the Susquehanna River, by Hardie Disney, and now in collection of State Museum (Frey, 'Check-list of the birds of Cumberland county, Pa.': 17, 1943).

December 1, 1923, one seen on the Susquehanna River at the same place, by Hardie Disney (*loc. cit.*).

March 17-31, 1939, one seen at West Chester Reservoir by F. Newman, Whitworth, and Conway (Conway, 'Check-list of the birds of Chester county, Pa.': 4, 1940 and 1943).

March 11, 1939, March 31, 1940, and March 30, 1941, single birds at Penn Manor, Bucks County, observed by J. Newman, Yoder, Reimann, et al., and reported at meetings of the Delaware Valley Ornithological Club.

Cruikshank ('Birds around New York City': 94-95, 1942) points out that, away from Long Island, the bird is known as a transient, chiefly during October and March, and that there is a lighter flight in spring than in fall. It is also interesting to note that in eastern Pennsylvania, lying inland from the immediate coastal area, there is but one fall record as compared with ten spring records.

It would seem that the arbitrary setting of the end of March, and, indeed, the first week of April, as the end of the "fall and winter" period results in a distortion of the ratio of fall and spring records so that the bird is apparently much rarer in spring than in fall. In eastern Pennsylvania, it is much more likely to be met with in spring than in fall, and in the whole eastern area, a reworking of the data in Mr. Hasbrouck's paper in the light of the actual migration habits of the species would probably show the same to be true. These criticisms do not in any way reflect on the other conclusions drawn by Mr. Hasbrouck concerning the abundance of the species in North America, the status in the Mississippi flyway, or the possibility of breeding stations in North America.—ALBERT E. CONWAY, Dept. of Biological Sciences, Drexel Institute of Technology, Philadelphia, Pennsylvania.

RECENT LITERATURE

The 'Museu Paulista'.—Dr. Pinto has given an interesting account of the ornithological collections of the 'Museu Paulista,' long known in the annals of South American ornithology and now, since January, 1939, a part of the Department of Zoology, Bureau of Agriculture, São Paulo, Brazil.

The collection appears to have had its origin in a private collection of miscellaneous material brought together by Colonel Joaquim Sartório and sold, late in 1890, to Francisco de Paulo Mayrnyk who presented it to the government of São Paulo. In 1893, it was proposed to erect a special building to house the collection and Dr. Hermann von Ihering was appointed to direct the museum's activities.

Extensive field work followed and many names familiar in Brazilian ornithology appear in the subsequent record—João Leonardo Lima, Adolfo Hempel, Ernst and Walter Garbe, Hermann Läderwaldt, Rodolfo von Ihering, and others, among whom the author, himself, must be given a prominent place. Their activities are recounted with their various expeditions and some of their more important discoveries. A list of the localities visited is appended and two excellent maps serve to show the position of these places. The account is illustrated by numerous photographs of people and terrain.—J. T. ZIMMER.

Birds of the Rio Juruá, Brazil.²—The basis of this fine report is a collection of 4518 birds secured by Alfonso M. Olalla and party in 1936, part of which is now retained in the Royal Natural History Museum in Stockholm. The collection contained 396 species and subspecies of which 60 had not previously been recorded from the Juruá. A number of new forms were discovered in the course of the study, four of which are described in the present account—*Forpus xanthopterygius olallae* (Lago de Cauaçu, Rio Amazon), *Scapanus trachelopyrus olallae* (Caxiricatuba, Rio Tapajoz), *Cyanerpes caeruleus hellmayri* (Potaro Highlands, British Guiana), and *Lamprosax tanagrinus macropterus* (Santo Antonio, Rio Eirú). Voluminous critical notes are given on most of the species, making the account a detailed taxonomic review of a considerable part of the west-Brazilian avifauna.

It is noted that *Loxia virens* Linnaeus is fully determined as identical to *Tanagra episcopus* Linnaeus, as was suggested by Hellmayr in 1936, but it is to be regretted that the formal proposal is now made to supplant the long-established *episcopus* by the newly-discovered equivalent. Both names are of exactly the same date, although they appeared on different pages of the same volume, so no question of priority was involved. The selection of *episcopus* could have been made with no disturbance of accepted names, but, as the choice of the first reviser, *virens* must now be adopted for the species and its typical subspecies.

Count Gyldenstolpe has performed a marked service in determining the status of the birds of this little-known part of Brazil and students of South American ornithology will be grateful for the careful study embodied in this report.—J. T. ZIMMER.

North-Bolivian birds.³—The lowlands of northern Bolivia have received comparatively little attention from ornithologists although they have not been entirely neglected. There still remained much to be accomplished in the region. Count

¹ PINTO, OLIVERIO. 'Cinqüenta anos de investigação ornitológica.' 4to. 4 il., pp. 1-80 [Arquivos Zool. Est. São Paulo, 4 (Art. 8): 261-240], 17 pls., 2 maps (fold.), 1945.

² GYLDENSTOLPE, NILS. The bird fauna of the Rio Juruá in western Brazil.' Kungl. Svenska Vet. Handl., 22 (3): 1-338, 1 map (fold.), Aug. 14, 1945.

³ GYLDENSTOLPE, NILS. 'A contribution to the ornithology of northern Bolivia.' Kungl. Svenska Vet. Handl., 23 (1): 1-300, 1 pl. (col.), 1 map (fold.), figs. 1-8, Oct. 29, 1945.

Gyldenstolpe instituted a thorough investigation of the area and sent an expedition in 1937 and 1938 under the leadership of Alfonso M. Olalla to the Department of Beni and the easternmost portion of the Territorio de Colonias. The result was the acquisition by the Royal Natural History Museum of Stockholm of some 3800 specimens of birds, representing 510 different species and subspecies of which 125 had not previously been found anywhere in Bolivia. Six forms found to be new were described, with others, in a previous paper [Ark. Zool., 33B (13): 1-10, 1941].

The whole collection Count Gyldenstolpe has studied critically with other rich material in the museum at Stockholm, and the present report gives a thorough discussion of the problems encountered in the investigation. In spite of the large number of forms discovered for the first time in the country, thirty-seven additional forms are known from the limited region under discussion that were not found by the party in the field. Sixteen others similarly recorded are believed to have been incorrectly determined in the light of the material in hand.

Discussions of the region (with photographs) and of previous explorations in the area give a good introduction to the paper. Count Gyldenstolpe has presented an excellent contribution which will be of service to future students of the birds of South America, not restricted to those of Bolivia.—J. T. ZIMMER.

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CORRESPONDENCE

QUANTITATIVE ORNITHOLOGY

THE EDITOR OF 'THE AUK':—Bird-banders have long been aware that they were accumulating far more material data than they could possibly digest with their present facilities. It has occurred to me that much could be done by setting forth the principles of quantitative statistical analysis for such people, and also for some others who are not banders.

I am collecting and attempting to compile some of the material on field techniques of quantitative ornithology, limiting myself to the numerical aspects. I would appreciate correspondence with all individuals who may have information or ideas on the subject.—AUSTEN FOX RIGGS, II, *Lowell I-44, Cambridge, Mass.*

NOTES AND NEWS

The American Ornithologists' Union has recently suffered the loss of Dr. Thomas Barbour and Major Allan Brooks, Fellows; Mr. Clinton G. Abbott and Frank L. Burns, Members; and Mr. Henry E. Tuttle and Allen Frost, Associates. Dr. Barbour died in Boston on January 8; Mr. Abbott, in San Diego on March 5; Major Brooks, at Courtenay, British Columbia, on January 4; Mr. Burns, at Berwyn, Pennsylvania, on February 7; Mr. Tuttle, at New Haven on March 8; and Mr. Frost, at Poughkeepsie, New York, on January 10.

Mr. Jean Delacour is in receipt of a letter from Dr. Georges Dementiev of the University of Moscow, in which it is stated that the library and collections with which Dr. Dementiev is associated are safe and in good condition. He has been on two expeditions to the Transcaspien region, one of which concerned the Karakum Desert. Of particular interest is the statement that a general work on the birds of the USSR is in preparation. This book will occupy six or seven volumes and will be similar in treatment to Witherby's 'Handbook of British Birds.' One volume is already in manuscript and will appear this year; two volumes are promised for next year.

Dr. J. J. Murray writes that: "Members of the A. O. U. will be interested in knowing that Dr. N. Tinbergen has come safely through the war. He and his family are well. The Germans closed the University of Leiden in 1940, but some work was kept up until 1942. At that time twenty professors of the University, including Tinbergen, were taken as hostages and kept in a German camp until liberated by the Canadians. He writes that Dr. Peter G. Van Tienhoven and Mr. J. Drijver, known to many of us for their conservation work in Holland, are also well."

Mr. Delacour advises that he will be pleased to transmit orders for copies of the 'Monographie des Pies-Grièches du genre *Lanius*' by Georges Olivier, reviewed in *The Auk*, 62: 643-646, Oct., 1945; price \$4.00. Mr. Delacour may be addressed at the American Museum of Natural History, Central Park West at 79th St., New York City.

OBITUARIES

VERDI BURTCH.—On a summer day, back somewhere about 1893 or 1894, two lads from Branchport, New York, arrived on bicycles at my home in Phelps, New York. While birds were the principal objects of their interest, they devoted that day especially to fresh water mollusca, and the three of us explored a few miles of Canandaigua Outlet. One of the lads, wearing knickerbockers, was sitting on a rock in mid-stream, trying to capture certain shellfish desiderata, when he slipped off into some two feet of water with a resounding splash. That was the debut of Verdi Burtch in my life. His companion was Clarence F. Stone, his close companion for many years. Stone died years ago and now Verdi is gone, having died at his Branchport, N. Y. home on December 27, last, at the age of 77.

Verdi Burtch, named after the Italian composer, Verdi, was born in Penn Yan, New York, on December 25, 1868, a son of Joel and Emma McGuinn Burtch, and was the eldest of five children. He was a descendant of the first settlers of Yates County. He was only 16 years old when his father died, at which time his youngest brother, Orba, was only two days old, and he thus early had to assume a large part of the responsibility of head of the family.

He worked for a time as a painter and paper-hanger and then entered into partnership with his brother, Orba, in a grocery and general store which, up to the time of his death, they maintained for forty-five years. Sharing to the full the responsibility of this exacting work, a less enthusiastic naturalist might easily have fallen away from his pet study, but this was not the case with Burtch. He managed, in his very limited spare time, to learn much of the home life of the local birds. Afield with his chum, Stone, he acquired a very good collection of nests and eggs of these local species. Doubtless Burtch and Stone saw more of the home life of the Cerulean Warbler in the famous Potter swamp near by than any other ornithologists, and found, also, many other interesting forms of life in this area.

Burtch became an Associate of the American Ornithologists' Union in 1891 and was advanced to Member in 1934. He attended many meetings of the Union, often driving from his Branchport home to sessions in New York, Philadelphia and even Canada, in company with one or more of his fellow members. He contributed some notes to the Auk and other publications and supplied much valuable material to Elon Howard Eaton's 'Birds of New York,' Bent's 'Life Histories' of North American birds, and Chapman's 'Handbook of Birds of Eastern North America.' He was, in addition, a veteran bird-bander and was active in the ranks of the Eastern Bird-Banding Association.

On June 28, 1894 he married Miss Maud E. Townsend of Dresden, who survives him, together with a daughter, Mrs. John N. Whitaker of Bluff Point; two sons, Forest Burtch of Trenton, N. J., and Kirkland Burtch of Branchport; four grandchildren and three brothers—Orba (his partner in the Branchport store), and Wright and Joel Burtch of Cleveland, Ohio.

Burtch will be missed by the many bird lovers who had the pleasure of knowing him, as a very definite personality for whom no one will quite substitute. With his quiet but deeply sincere love of birds and nature, his many friends are certain to feel that, among all the companionable bird men, there will never be quite another Verdi Burtch.—B. S. BOWDISH.

FRANK COATES KIRKWOOD, an Associate of the American Ornithologists' Union since 1892, died on August 27, 1945, at Texas, Maryland, at the age of 83, and was

buried on August 29 at Fork, Maryland. He was born in Belfast, Ireland, March 25, 1862, the son of Mr. and Mrs. William T. Kirkwood.

I know very little of his boyhood, but he must have had an early interest in birds, as is evidenced from two notebooks of "Extracts relative to such [birds] as breed in Ireland" copied from "Birds of Ireland" by William Thompson, Esq. These notes were in the back of a school notebook used at the Royal Belfast Academical Institution of Belfast in 1878. Little is known of Kirkwood's school days. In the above-mentioned notebooks there are references to lessons in Latin, Greek, geography, general history, British history, and spelling, so it is presumed that he had a fairly good education. On June 28, 1878, he received a prize (a handsome leather-bound book, 'Life of Frederick the Great' by Francis Kugler) from the headmaster of the writing department for "superior penmanship"—the reason for his small but legible writing. From early letters from his brother it is evident that he had an egg collection at an early date, but whether or not he brought this collection with him to the United States is not known.

Late in 1880, at the age of 18, Kirkwood came to Baltimore to work as a book-keeper or clerk in his maternal uncle's soap factory, James Armstrong & Co., 115 Concord St., where he remained until his uncle went bankrupt in the early 1900's. After the failure of his uncle's factory, he bought a small farm off the Stansbury Mill Road in Baltimore County, worked it for some years, and later sold it. Thereafter he boarded with neighbors and did what odd jobs he could that did not interfere with his bird work.

He was married to Anna M. Hoen, November 12, 1919, but this marriage did not prove successful and he and his wife soon separated. During his last years he received an old-age pension from Baltimore County and lived in a small shed with his notes and books, getting his meals at Kenneth Marshall's, on whose property he had built his small abode.

In his nearly 65 years in the United States, most of which were spent in Maryland, he kept detailed and accurate notes on all natural history subjects, but his primary interest was birds. He made his field notes in various kinds of notebooks and later transferred them to small strips of paper which were filed by species in cigar boxes. In his first notebook the first note reads as follows: "Dec 11, 1880 The first land bird to greet my arrival was our own House Sparrow (*P. domestic*) It is here called the English Sparrow and is nearly as thick in Baltimore as in Belfast although it is only a few years since they were introduced."

Not long after his arrival in Baltimore he joined the Maryland Academy of Sciences, where he met and worked with many of his life-long friends and helped to build up the Academy's collection of skins and eggs; in 1895, the Academy published his "Birds of Maryland." He also joined the Maryland State Game and Fish Protective Association, taking an active part in this organization as Secretary-Treasurer from 1898 to 1901.

Between 1900 and 1906, Kirkwood took an active interest in fishes, gathering a good deal of data as well as specimens from the Atlantic Ocean and Chesapeake Bay, with the idea of publishing a book on fishes. The specimens have disappeared. It was thought they were in the U. S. National Museum, but they are not there. Possibly they were turned over to the Maryland Academy of Sciences of Baltimore, which has given its building to the government as a hospital and put its collections in storage; their records are not available.

As was customary with all of the early ornithologists, Kirkwood did a good deal of collecting, for identification of birds was not as simple then as it is now. Most of his collecting was confined to eggs, of which at one time he had a fine, well-prepared

collection of Maryland species, but for the past twenty years, at least, they have been in the loft of a barn, neglected, and are of little or no value now.

In 1924 and 1925, Kirkwood, in collaboration with William H. Fisher and others, under the auspices of the State Game Commission of Maryland, started a revision and enlargement of the 'Birds of Maryland,' but unfortunately he never completed the task. This is a loss to Maryland ornithology, for no one will be able to interpret his copious notes as he could have done. Kirkwood was a keen and accurate observer and his knowledge of the habits and songs of Maryland birds was extensive, both from personal observation and from correspondence with other ornithologists, including Robert Ridgway, G. Eifrig, William Palmer, Dr. A. K. Fisher, Ralph W. Jackson, and many others. He was a witty but stubborn Irishman, a good sport and a good companion on field trips. One could always enjoy excursions with him and profit by his knowledge of birds. Most of his writings were confined to his notes, two of which follow:

"Jan. 13, 1921. Rough-leg Hawk. Coming down out of No. 3 about 4 p. m. and stepping out into old lane one flushed from the ground among bushes not 10 feet from me. It had killed and eaten the flesh off the neck of one of my hens. The bank on the side I came down prevented it seeing me until I stepped into lane, and the W. wind prevented it hearing me. Getting its flight it flew rather heavily and slowly to a poplar at the lower edge of No. 4 and stayed there while I got my field glasses and examined it and later flew to the edge of clearing and stayed there until nearly dark."

"March 24, 1924. Cowbird, one walking in shallow water picks up several small items which it swallows at once, it then makes a quick grab and throws a cray fish up in the air. This it does several times, then it pulled legs off one by one, apparently the cray fish caught its bill each time it grabbed a leg and was thrown up to shake it loose, all this within 20 feet of me. It then picked up the cray fish and flew among the elders, where I could not see it. A few minutes later it went up into a willow, here it uttered a "chuk" in a low tone with a weak low warble that I would not have heard if it had not been so close, but I could clearly see the bill and throat move."

From August 20 to 29, 1900 Kirkwood made a trip to Cobb's Island, Virginia, and the outer islands along the Atlantic coast of Maryland and Virginia, and sent a report to William Dutcher, part of which was published in 'The Auk,' as listed below. In the same year he wrote a series of popular articles on birds for the Baltimore Sun.

The following notes and articles appeared in the Auk:

A list of the birds of Maryland (rev. by Chapman). *Auk*, 13: 67, 1896.

Red-head (*Aythya americana*) in post-nuptial plumage in autumn. *Op. cit.*, 15: 50, 1898.

The Stilt Sandpiper in Maryland. *Op. cit.*, 16: 76, 1899.

(Notes on Cobb's and other islands along the Atlantic coast) In William Dutcher's report on protection of gulls and terns. *Op. cit.*, 18: 78-83, 1901.

The occurrence of the Egyptian Goose in North America. *Op. cit.*, 17: 64, 1900.

The Cerulean Warbler (*Dendroica caerulea*) as a summer resident in Baltimore County, Maryland. *Op. cit.* 18: 137-142, 1901.

Early occurrence of the Black Scoter in Maryland and Virginia. *Op. cit.*, 18: 190, 1901.

Chestnut-collared Longspur (*Calcarius ornatus*) in Maryland. *Op. cit.*, 25: 84, 1908.

Cliff Swallow (*Petrochelidon lunifrons*) again nesting in Baltimore County, Maryland. *Op. cit.*, 42: 275-276, 1925.

Unusual nesting site of Great Horned Owl. *Op. cit.*, 42: 444-445, 1925.

A Raven in Baltimore County, Maryland. *Op. cit.*, 47: 255, 1930.—W. BRYANT TYRRELL.

THE AMERICAN ORNITHOLOGISTS' UNION AT A GLANCE

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FREDERICK C. LINCOLN

Treasurer and Business Manager

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